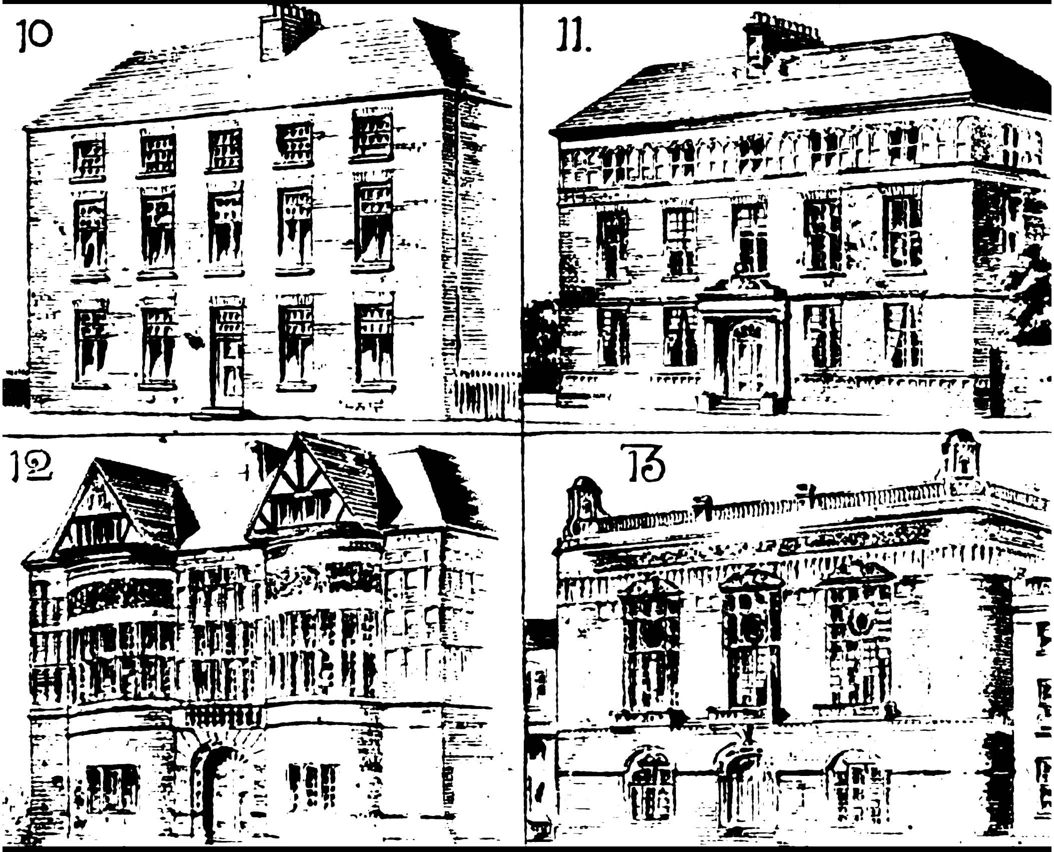

Architecture for general readers

Henry Heathcote Statham

ARCHITECTURE FOR GENERAL READERS.

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I.

ST. PAUL'S CATHEDRAL:

FROM A DRAWING BY THE AUTHOR.

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ARCHITECTURE : FOR : GENERAL : READERS : A : SHORT : TREATISE : ON : THE : PRINCIPLES : AND : MOTIVES : OF : ARCHITECTURAL : DESIGN.

WITH : A : HISTORICAL : SKETCH.

BY

H : HEATHCOTE : STATHAM : FELLOW : OF : THE : INSTITUTE OF ARCHITECTS : EDITOR OF THE **Builder.**

With Illustrations drawn by the Author.

THIRD EDITION, REVISED.

"Architecture can want no commendation, where there are noble men, or noble minds."—SIR HENRY WOTTON.

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PREFACE

THE object of this little book is to supply, in a condensed form, such an outline of the principles, the practice, and the historical development of the art of Architecture as may be acceptable to those who, taking an intelligent interest in the subject, have not time or inclination to study more technical and detailed treatises. I have often been asked to recommend such a book, and having to reply that there was, as far as I knew, no such work in the English language, I have here endeavoured to supply the deficiency.

Some apology may seem to be required for the comparatively brief space devoted to the historical sketch, while the larger portion of the book is occupied with theoretical considerations, partially illustrated, however, from historical fact. But I have long been convinced that the want of general interest in architecture, and of any settled convictions in regard to what is admirable or the reverse in architectural design, among the more educated portion of the general public of this country, is mainly due to the want of any definite attempt to reason on the subject, to consider why

this is good and that is bad in architecture. Amateur architectural judgments are too often swayed merely by the habit or fashion of the day. But architecture, not being, like painting and sculpture, in any degree an imitative art, is to a great extent a matter of reasoning. It is the attempt to give forcible or graceful expression to facts of construction and planning; and without a clear perception of those facts, and of their relation to the attempted expression of them, anything like a rational judgment on architectural design is impossible.

My principal object has been, therefore, to persuade the "general reader" to bestow some thought upon the meaning and *raison d'être* of architecture, rather than to regard it merely as the history of a succession of various buildings in various styles. And as one means towards the elucidation of the thought which is at the bottom of all architectural design worth calling such, I have given an analysis of the two most logical and complete styles that have existed, the Greek and the Gothic, which are also the most complete expressions hitherto existing of the two main principles of construction, those in which spaces are covered respectively by the beam or the arch, in which the constructional pressures are on the one hand simple and perpendicular, on the other hand complex and lateral. The history of the development of these styles is necessarily to a considerable extent involved in their analysis; such gaps as are left in it are, I hope, sufficiently filled up in the course of the "Historical Sketch." Considerable space is also devoted to the subject of planning, as the basis of design, and an entire chapter is given to "mouldings," a most important element in architectural de-

sign, of which in general little or nothing is said in treatises intended for lay readers.

In cases where, in regard to the illustrations, the words "typical plan" or "typical design" are used, I mean by that expression a plan or design which includes points all of which are to be found in prominent buildings of the class referred to, though they may not all be found combined in any one existing building.

I have to thank the proprietors of the *Builder* for the permission to use, as a frontispiece, a reduction from the drawing of St. Paul's Cathedral which was made for the *Builder* Series of "Cathedrals of England and Wales."

H. H. S.

London, 1895.

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ARCHITECTURE FOR GENERAL READERS.

THERE are two kinds of fallacy, in regard to the nature of architecture, which are prevalent among *dilettanti* and others who have not given much thought or study to the subject, though they are never held by the same individuals, since they are mutually exclusive. One of these, which is often met with among those who are not unacquainted with art in other forms, is that architecture consists wholly in giving a kind of pictorial treatment to buildings, and in decorating them by the addition of certain accepted forms, such as columns and carved capitals, which are supposed to confer upon a building architectural character; and among painters and sculptors (most of whom have not the least idea what architecture means) we frequently hear it said that buildings fall short of any claim to be called architectural, in the fuller sense, unless they are decorated with sculpture and painting. This latter view, indeed, the *dilettante* world has not accepted. If we were to put the question to an assembly of travelled and cultivated persons, who had seen the principal architectural monuments of the world, what building they would select as having given them the greatest impression of pure poetic beauty, it is probable that a majority would vote for the Taj Mahal at Agra, a structure of almost dreamlike beauty, in speaking of which the dullest writer of travels grows

eloquent, and which is absolutely destitute of sculpture or painting, and was the work of architects who were forbidden by their creed to make use of either art in any imitation of the forms of nature, and were therefore restricted to the use of abstract geometrical ornament. This idea of architecture as a mere vehicle for sculpture and painting we may therefore dismiss, without further consideration, as one which has never been popularly adopted, although the main fallacy that architecture is the production of ornamental exteriors to buildings is one that is very widespread.

The opposite or utilitarian fallacy is one of comparatively modern growth, and possibly not very prevalent anywhere but in England, where it has arisen out of the recent development of sanitary science. The discovery having been made that the proper sanitary construction and drainage of buildings is a matter of great importance in its bearing on human life and health, and one which has been hitherto much neglected, many persons, especially such as write on architecture in the newspapers, seem to have run away with the idea that architecture after all only means sound construction and sanitation, and is all based upon the drain-pipe as its true foundation.

Each of these fallacies is a kind of half-truth, arising from an incomplete grasp of the subject. The basis of architecture is undoubtedly utilitarian, in the case of the great majority of buildings. The highest and ultimate object of architecture is undoubtedly the production of something which appeals to our sense of beauty and picturesqueness. But these two elements in architecture cannot rightly be regarded apart from one another. They are indissolubly connected. To the mind of the true architect, the whole building, the plan, the construction, and the exterior treatment, form one homogeneous conception or *design*, to use in its full sense a word which is commonly and

most erroneously applied to the mere treatment of the exterior clothing of the structure. The plan is a portion of the whole conception; the function of the architect is to raise a *plan* from a mere utilitarian arrangement of rooms or spaces into an artistically conceived system in subordination to one central idea which governs the whole structure, and to which construction and exterior clothing alike conform; so that the building which we are obliged to raise, in the first instance, for practical necessity or convenience, becomes for its own sake an object of interest and beauty, instead of a mere utilitarian combination of floors, walls, and roofs to shelter a race who care nothing for beauty, and who only want to have their physical comfort provided for.

Architecture, then, from the point of view from which I am asking the reader to regard it—and the only point of view in which it is worth the serious regard of thoughtful people—is the art of erecting expressive and beautiful buildings. I say expressive *and* beautiful, and I put expressive first, because it is the characteristic which we can at least realise even when we cannot realise what can fairly be called beauty, and it is the characteristic which comes first in the order of things. A building may be expressive and thereby have interest, without rising into beauty; but it can never be, architecturally speaking, beautiful, unless it has expression. And what do we mean by expression in a building? That brings us to the very pith of the matter.

We know pretty well what we mean when we say that a painted or sculptured figure is expressive. We mean that, while correctly representing the structure of the human figure, it also conveys to our minds a distinct idea of a special emotion or sentiment, such as human beings are capable of feeling and expressing by looks and actions. Expression in this sense a

building cannot be said to have. It is incapable of emotion, and it has no mobility of surface or feature. Yet I think we shall see that it is capable of expression in more senses than one. It may, in the first place, reflect more or less the emotion of those who designed it, or it may express the facts of its own internal structure and arrangement. The former, however, can only, I think, be said to be realised in the case of architecture of the highest class, and when taken collectively as a typical style. For instance, we can all pretty well agree that the mediæval cathedral indicates an emotion of aspiration on the part of its builders. The age that built the cathedrals longed to soar in some way; this was the only way open to it, and it sent up its soul in spreading vaults, and in pinnacles and spires. So also we can never look at Greek architecture without seeing in it the reflection of a nature refined, precise, and critical; loving grace and finish, but content to live with the Graces and the Muses without any aspirations that spurned this earth. We can hardly go further than this in attributing emotional expression to architecture. But in a more restricted sense of the word "expression," a building may express very definitely its main constructive facts, its plan and arrangement, to a certain extent even its purpose, so far at least that we may be able to identity the class of structure to which it belongs. It not only may, but it ought to do this, unless the architecture is to be a mere ornamental screen for concealing the prosaic facts of the structure. There is a good deal of architecture in the world which is in fact of this kind—an ornamental screen unconnected with the constructional arrangement of the building; nor is such architecture to be entirely scouted; it may be a very charming piece of scenery in itself, and you may even make a very good theoretical defence for it, from a certain point of view; but on the whole, architecture on that principle becomes uninteresting;

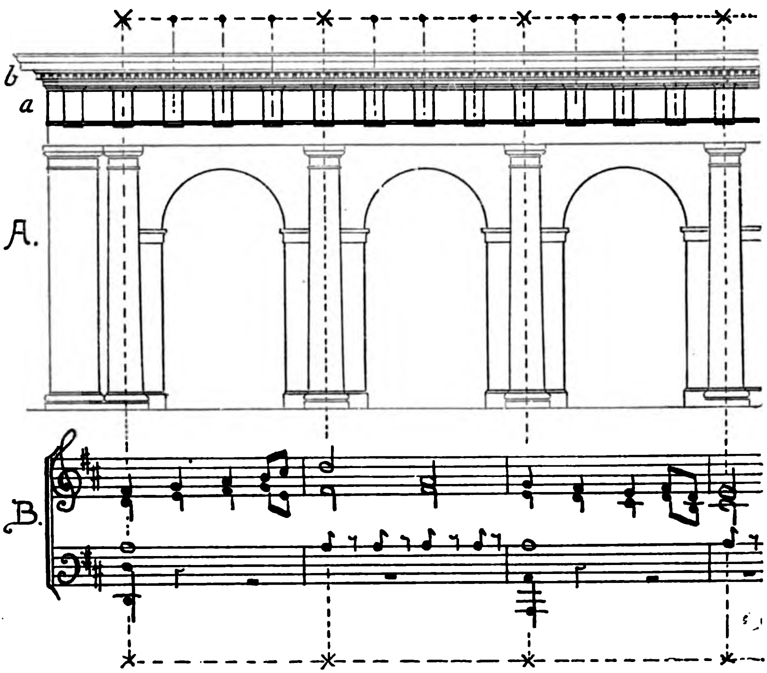
you very soon tire of it; it is a mask rather than a countenance, and the indulgence in it tends to the production of a dull uniformity of conventional design.

For we must remember that architecture, although a form of artistic expression, is not, like painting and sculpture, unfettered by practical considerations; it is an art inextricably bound up with structural conditions and practical requirements. A building is erected first for convenience and shelter, secondly only for appearance; except in the case of such works as monuments, triumphal arches, etc., which represent architectural effect pure and simple, uncontrolled by practical requirements. With such exceptions, therefore, a building ought to express in its external design its internal planning and arrangement; in other words, the architectural design should arise out of the plan and disposition of the interior, or be carried on concurrently with it, not designed as a separate problem. Then a design is dependent on structural conditions also, and if these are not observed the building will not stand; and hence it is obvious that the architectural design must express these structural conditions; it must not appear to stand, or be constructed, in a way in which it could not stand (like the modern shop-fronts which appear to rest on sheets of plate-glass); and its whole exterior appearance ought to be in accordance with, and convey the idea of, the manner and principle on which it is constructed. The most important portions of the interior must be shown as such externally by the greater elaboration and emphasis of their architectural treatment. If the general arrangement of the plan is symmetrical on either side of a centre (which, however, it cannot often be except in the largest type of monumental or public buildings), the architectural treatment must be symmetrical; if the building is necessarily arranged, in accordance with the requirements of the plan, unsymmetrically, the architectural

treatment must follow suit, and the same principle must be carried out through all the details.

Now this dependence of architectural design upon plan and construction is one of the conditions which is often overlooked by amateurs in forming a judgment upon architectural design; and the overlooking of this is one reason of the uncertainty of opinion about architecture as compared with such arts as sculpture and painting. Few people know or care much about the structure and planning of buildings except those whose business it is to do so; and consequently they do not realise what it is which they should look for in the architectural design. They like it or do not like it, and they regard this as what is called a mere "question of taste," which, according to the proverb, is not to be disputed about. In fact, however, the good or bad taste of an architectural design—say, if you like, its correctness or incorrectness, is to a considerable extent a matter of logical reasoning, of which you must accurately know the premisses before you can form a just conclusion. But there is another reason for this prevalent uncertainty and vagueness of opinion, arising out of the very nature of architectural art itself, as compared with the imitative arts. A painting of a figure or a landscape is primarily a direct imitation of the physical facts of nature. I do not for a moment say it is only that, for there is far more involved in painting than the imitation of nature; but the immediate reference to nature does give a standard of comparison which to a certain extent every eye can appreciate. But architecture is not an art which imitates natural forms at all, except as minor decorations, and it then does so, or should do so, only in a conventionalised manner, for reasons which we shall consider later on. Architecture is, like music, a metaphysical art; it deals with the abstract qualities of proportion, balance of form, and direction of line, but without any imitation

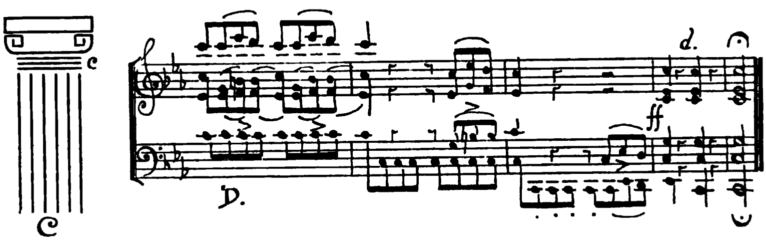
of the concrete facts of nature. The comparison between architecture and music is an exercise of the fancy which has often been pushed too far, but there is really a definite similarity between them which it is useful to notice. For instance, the regular rhythm, or succession of accentuated



points in equal times, which plays so important a part in musical form, is discernible in architecture as a rhythm in space. This may be illustrated to the eye by spacing out music type so that there is an equal space between the notes which occur at equal times, as at *B*; erecting a piece of architectural design over it, the main accentuated portions of the design in *A*, the columns, correspond with the main accentuated points of

the music; the repetition of the triglyph blocks at *a* forms a subordinate rhythm, which corresponds with that of the four crotchets in the music. The row of dentils at *b* forms a rhythm of much smaller intervals; so small, that like a long shake in music, its pulsations may remain independent of the larger divisions of the rhythm. We may treat a cottage type of design, no doubt, with a playful irregularity, especially if this follows and is suggested by an irregularity of plan; but in architecture on a grand scale, whether it be in a Greek colonnade or a Gothic arcade, we cannot tolerate irregularity of spacing except where some constructive necessity affords an obvious and higher reason for it. Then, again, we find the unwritten law running throughout all architecture that a progress of line in one direction requires to be stopped in a marked and distinct manner when it has run its course, and we find a similarly felt necessity in regard to musical form. The repetition, so common at the close of a piece of music, of the same chord several times in succession, is exactly analogous to the repetition of cross lines at the necking of a Doric column to stop the vertical lines of the fluting, or to the strongly-marked horizontal lines of a cornice which form the termination of the height or upward progress of an architectural design. Thus if we compare the diagram *C* (a conventional decorative representation of a fluted column and capital) with the musical quotation *D*, we perceive that the three cross lines at *c* play the same part in the design as the three repeated chords at *d*; in *C* the vertical lines represent upward movement, checked by the three cross lines; in *D* the passage previous to the penultimate bar is felt by the hearer as expressing impetuous movement, which is checked and brought up by the three strongly marked repeated chords, which form a bar to further progress. The analogy is here very close. A less close analogy may also be felt between

an architectural and a musical composition regarded as a whole. A fugue of Bach's is really a built-up structure of tones, in accordance with certain ideas of relation and proportion, just as a temple or a cathedral is a built-up structure of lines and spaces in accordance with ideas of relation and proportion; both appeal to the sense of proportion and construction in the brain, the one through the ear, the other through the eye. Then, in regard to architecture again, we have further limiting conditions arising not only out of the principle of construction employed, but out of the physical properties of the very material we employ. A treatment that is suitable



and expressive for a stone construction is quite unsuitable for a timber construction; details which are effective and permanent in marble are ineffective and perishable in stone, and so on: and the outcome of all this is that all architectural design has to be judged not by any easy and ready reference to exterior physical nature, with which it has nothing to do, but by a process of logical reasoning as to the relation of the design to the practical conditions, first, which are its basis, and the relation of the parts to each other. Of course, beyond all this there is in architecture, as in music, something which defies analysis, which appeals to our sense of delight we know not how or why, and probably do not want to know; the charm might be dissolved if we did. But

up to this point architectural design and expression are based on reasoning from certain premisses; the design is good or bad as it recognises or ignores the logic of the case, and any criticism of it must rest on a similar basis. It is a matter of thought in both cases, and without thought it can neither be designed nor appreciated to any purpose.

The reader may say, may not a design satisfy all these logical conditions, and yet be cold and uninteresting, and give one no pleasure? Certainly it may; indeed, we referred just now to that last element of beauty which is beyond analysis; but if we cannot analyse the result, I rather think we can express what it is which the designer must evince, beyond clear reasoning, to give the highest interest to his architecture. He must have taken pleasure and interest in it himself. That seems a little thing to say, but much lies in it. As Matthew Arnold has said of poetry:

> What poets feel not, when they make
>   A pleasure in creating,
> The world, in its turn, will not take
>   Pleasure in contemplating.

The truth runs through all art. There are, alas, so many people who do not seem to have the faculty of taking pleasure; and there is so much architecture about our streets which it is impossible to suppose any one "took pleasure in creating." When a feature is put into a design, not because the designer liked it, but because it is the usual thing and it saves trouble, it always proclaims that melancholy truth. But where something is designed because the designer liked doing it, and was trying to please his own fancy instead of copying what a hundred other men have done before, it will go hard but he will give some pleasure to the spectator. It is from this blessed faculty that a design becomes inspired with what is

best described as "character." It is not the same thing as "style." I have something to say presently as to what I think style means; but it is certain that a building may have style and yet want character, and it may have a good deal of character and yet be faulty or contradictory in style. We cannot define "character," but when we feel that it is present, we may rely upon it that it is because the designer took interest and pleasure in his work; was not doing it merely scholastically—in short, he put something of his own character into it; which means that he had some to put.

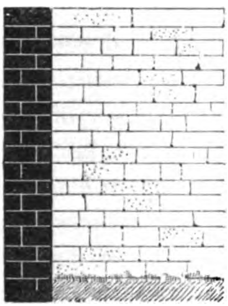


Fig. 1.

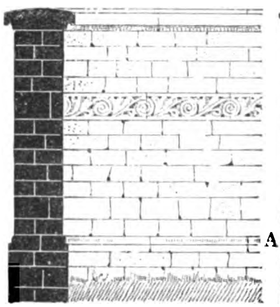


Fig. 2.

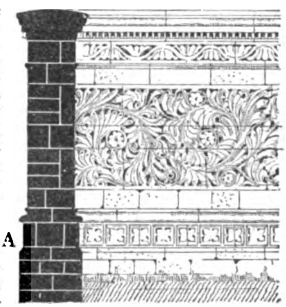


Fig. 3.

Now, coming back to the axiom before mentioned, that architectural design should express and emphasize the practical requirements and physical conditions of the building, let us look a little more in detail into the manner in which this may be done. We will take, to begin with, the very simplest structure we can possibly build—a plain wall (Fig. 1).* Here there is no expression at all; only stones piled one on another, with sufficient care in coursing and jointing to give stability to the structure. It is better for the wall constructively,

* The dark-shaded portions in this and the next two diagrams show the "section" of the wall, as seen if we cut it through and look at it end-wise.

however, that it should be widened at the base, to give it more solidity of foundation, and that the coping should project beyond the face of the wall, in order to throw the rain off, and these two requirements may be treated so as to give architectural expression to our work (Fig. 2). It now consists of three distinct portions—a plinth, or base, a superficies of wall, and a coping. We will mark the thickening at the base by a moulding which will give a few horizontal lines (at A), and the coping in the same way. The moulding of the coping must also be so designed as to have a hollow throating, which will act as a drip, to keep the rain from running round the under-side of the coping and down the wall. We may then break up the superficies by inserting a band of simple ornament in one course of this portion of the wall; not half-way—for to divide any portion of a building into mere "halves" has usually a weak and monotonous effect—but about two-thirds of the distance from the base line; and this band of ornament not only breaks up the plain surface a little, but also, by carrying another horizontal line along the wall, emphasizes it horizontally. Always emphasize that which is the essential characteristic of your structure. A wall of this kind is essentially a long horizontal boundary; emphasize its length and horizontality. If we are millionaires, and can afford to spend a great deal on a wall, we may not only (Fig. 3) carry further the treatment of the coping and base, by giving them ornamental adjuncts as well as mouldings, but we might treat the whole wall-superficies as a space for surface carving, not mechanically repeated, but with continual variation of every portion, so as to render our wall a matter of interest and beauty while retaining all its usefulness as a boundary, observing that such surface ornament should be designed so as to fulfil a double object, (1st) to give general relief to the

surface of the wall, (2nd) to afford matter of interest to the eye on close inspection and in detail. That is the double function of nearly all architectural ornament: it is, in the first place, to aid the general expression and balance of the building, and give point and emphasis where needed; and, in the second place, to furnish something to the eye for study on its own account when viewed more closely.

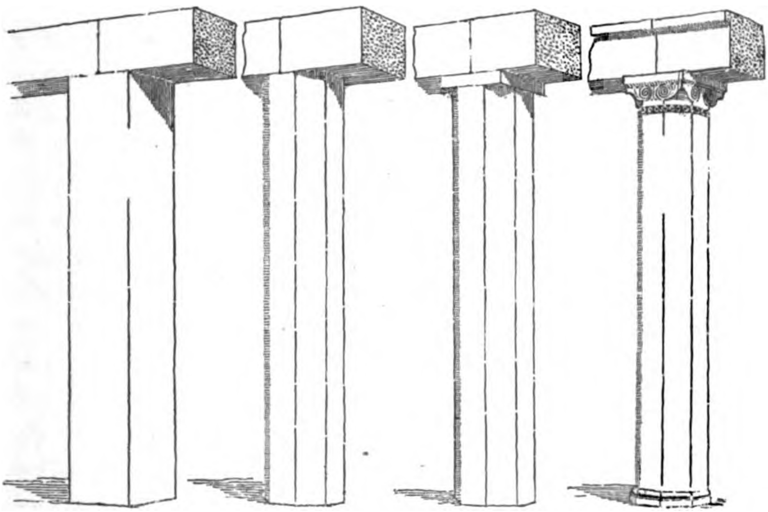


Fig. 4. Fig. 5. Fig. 6. Fig. 7.

We will take another typical and simple erection, a stone pillar to support the ends of two lintels or beams. This may be simply a long squared piece set on end (Fig. 4), and will perform its constructive functions perfectly well in that form; but it is not only absolutely expressionless, but is in one sense clumsy and inconvenient, as taking up more space than need be, presenting an unwieldy-looking mass when viewed at an angle, and shutting out a good deal of light (if that happen to be a matter of practical consequence in the case).

Cutting off the angles (Fig. 5) does not weaken it much, and renders it much less unwieldy-looking, besides giving it a certain degree of verticality of expression by increasing its number of vertical lines or edges, and rendering it more convenient as taking up less room and obstructing less light. But though the column is quite strong enough, the octagonal top does not make so good a seat or bearing for the ends of the lintels; we will therefore put a flat square stone on the top of it (Fig. 6) which will serve as a bed for the lintels to rest on securely. But the angles of this bed-plate, where they project beyond the face of the column, appear rather weak, and are so actually to some extent: a double defect, for it is not enough in architecture that a thing should actually be strong enough, it is necessary also that it should *appear* so architecture having to do with expression as well as with fact We will, therefore, strengthen this projecting angle, and correct the abruptness of transition between the column and the bed-plate by brackets (Fig. 7) projecting from the alternate faces of the column to the angles of the bed-plates. As this rather emphasizes four planes of the octagon column at the expense of the other four, we will bind the whole together just under the brackets by a thin band of ornament constituting a necking, and thus we have something like a capital developed, a definitely designed finish to our column, expressive of its purpose. This treatment of the upper end, however, would make the lower end rising abruptly from the ground seem very bare. We will accordingly emphasize the base of the column, just as we emphasized the base of the wall by a projecting moulding, not only giving expression to this connection of the column with the ground, but also giving it the appearance, and to some extent the reality, of greater stability, by giving it a wider and more spreading base to rest on. We

have here still left the lines of our column vertically parallel, and there is no constructive reason why they should not remain so; there is, however, a general impression to the eye both of greater stability and more grace arising from a slight diminution upward. It is difficult to account for this on any metaphysical principle, but the fact has been felt by most nations which have used a columnar architecture, and we will accept it and dimi-

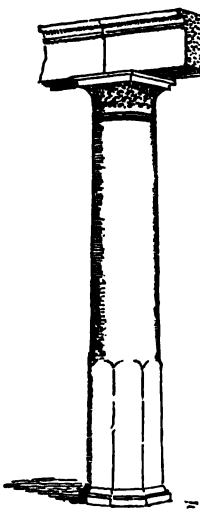


Fig. 8.

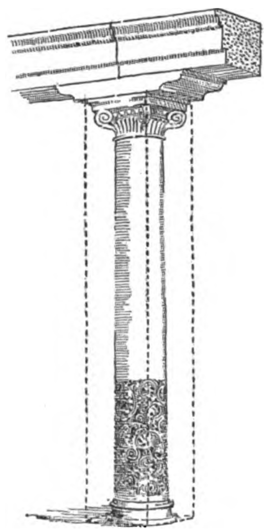


Fig. 9.

nute (so to speak) our column (Fig. 8). We have here taken a further step by treating the shaft of the column in two heights, keeping the lower portion octagonal and reducing the upper portion to a circle, and we now find it easier to treat the capital so as to have a direct and complete connection with the column, the capital being here merely a spreading out of the column into a bracket form all round, running it into the square of the

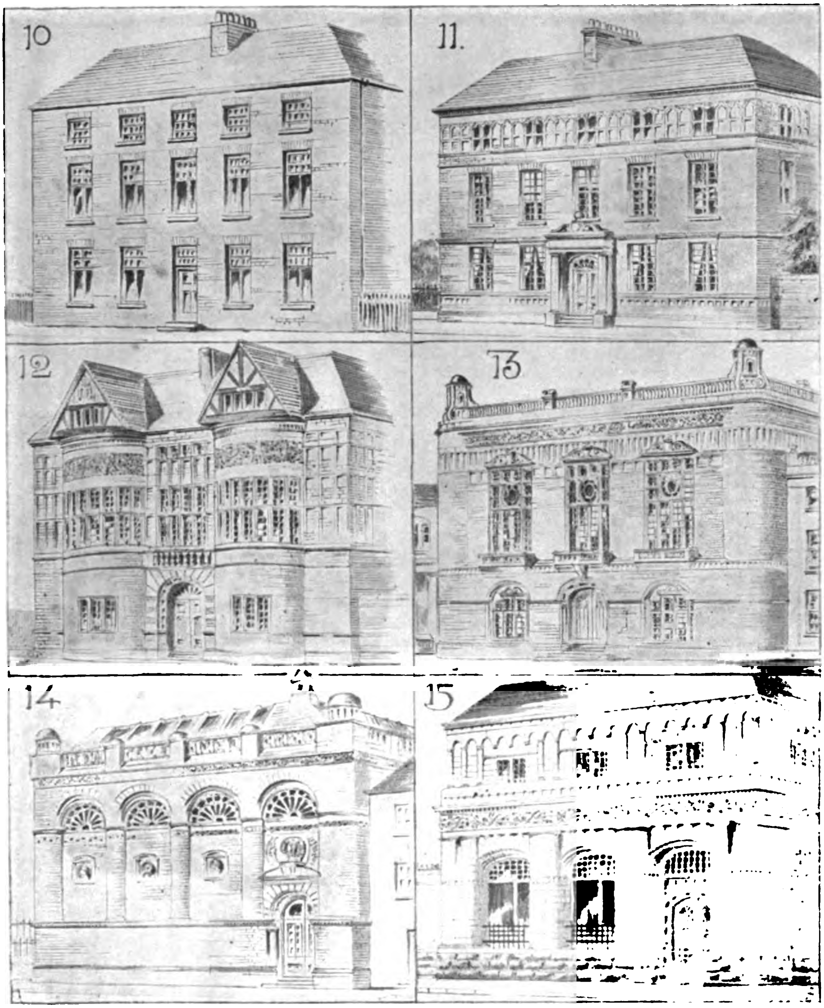
bed-plate.* The spreading portion is emphasized by surface ornament, and the necking is again emphasized, this time more decisively, by a moulding, forming a series of parallel rings round the column. If we wish to give our column an expression of more grace and elegance, we can further reduce the thickness of it (Fig. 9), and give more spread to the capital, always taking care that the strength of the column is not reduced below what the weight which it has to carry requires. In this case a bracket is shown above the capital, projecting longitudinally only (in the direction of the lintel bearing), a method of giving a larger bearing surface for the ends of the lintels, shortening their actual bearing † (in other words, widening the space which can be bridged between column and column), and giving a workmanlike appearance of stability to the construction at this point. The idea of the division of the column into two sections, suggested in Fig. 8, is kept up in Fig. 9, by treating the lower portion, up to the same height, with incised decorative carving. The dotted lines on each side in Fig. 9 give the outline of the original square column as shown in Fig. 4. The finished column was within that block; it is the business of the architectural designer to get it out.‡

Let us see if we can apply the same kind of process of evolving expression in regard to a building. We will take again

* This bed-plate is the feature called "abacus" (*i.e.*, "tile") in Greek architecture, but I am here considering it apart from any special style or nomenclature.

† "Bearing," in building language, is used in a double sense, for the distance between the points of support, and the extent to which the beam rests on the walls. Thus a beam which extends 20 feet between the points of support is a beam of 20 feet bearing; if the beam is 22 feet long, so that 1 foot rests on the walls at each end, it has "1 foot bearing on the walls."

‡ None of the forms of column sketched here have any existence in reality; they are purposely kept apart from imitation of accepted forms, to get rid of the idea that architecture consists in the acceptance of any particular form sanctioned by precedent.



VARIED EXPRESSION IN BUILDING.

the very simplest form of building (Fig. 10), a square house with a door in the centre and uniform rows of windows. There cannot be said to be any architectural expression in this; there is no base or plinth at all, no treatment of the wall; the slight projection at the eaves is only what is necessary to keep the rain from running down the walls, and facilitate the emptying of the gutters, and the even spacing of the windows is desirable for constructive reasons, to keep the masses of wall over each other, and keep the whole in a state of equally balanced pressure. The first thing we might do in endeavouring to give some expression to the building would be to give it a base or plinth (Fig. 11), and to mark that and the cornice a little more decidedly by mouldings and a line of panelling at the plinth. The house being obviously in three stories, we should give it some echo externally of this division into horizontal stages by horizontal mouldings, or what are called, in architectural phraseology, "string-courses," not necessarily exactly at the floor-levels, but so as to convey the idea of horizontal division; observing here, as in the case of the wall and column, that we should take care not to divide the height into equal parts, which is very expressionless. In this case we will keep the lower string close down on the ground-floor windows, and keep these rather low, thus showing that the ground-floor apartments are not the most important; while the fact that the first-floor ones are so is conversely made apparent by keeping these windows rather higher, putting a double string-course over them, and a slight extra depth of moulding, forming a kind of cornice, over each. The space left between these and the roof, in which the attic windows are placed, is treated with a series of mullions and panellings into which the attic windows are worked as part of the series of openings; this gives a little richness of effect to the top story, and a continuity of treatment which binds the whole series of

windows together. To have treated the whole of the walls and windows in this way would have been merely throwing away labour; what little effect it has consists in the "character" given by the contrast of this top-story treatment with the plain wall surfaces below. The last thing is to emphasize the door, as the principal opening in the walls, and quite distinct in use and meaning from the other openings, by giving it a little architectural frame or setting, which may be done in many ways, but in this case is done by the old-fashioned device (not very logical certainly) of putting a little entablature over it, and a column on either side; there is, however, this to be said for it, that the projecting entablature forms a semi-porch, protecting those at the door somewhat from rain; it must be carried in some way, and columns are the readiest and most seemly manner of doing it, and they also form, practically, something of a weather screen; the bases on which they stand also form a framework or enclosing wall for the steps, which are thus made part of the architectural design, instead of standing out as an inconvenient and awkward projection, as on Fig. 10. We have now given the house a little general expression, but it still is vague in its design as far as regards the distribution of the interior; we do not know whether the first floor, for instance, is one large room, or two or more rooms, or how they are divided. Let us try grouping the windows a little, and at the same time breaking up the flat surface of the front wall (Fig. 12). Here as before, we have divided the building by a horizontal string, but only by one main one on the first-floor level, keeping the same contrast, however, between a richer portion above and a plainer portion below; we have divided the building vertically, also by two projecting bays finishing in gables, thus breaking also the sky-line of the roof, and giving it a little picturesqueness, and we

have grouped the windows, instead of leaving them as a mere row of openings in the wall at equal distances. The contrast between the ground and first floor windows is more emphatic; and it is now the more evident that the upper floor rooms are the best apartments, from their ample windows; it is also pretty evident that the first floor is divided into two main rooms with large bay windows, and a smaller room or a staircase window, between them; the second-floor windows are also shifted up higher, the two principal ones going into the gables, showing that the rooms below them have been raised in height. Windows carried up the full height of these rooms, however, might be too large either for repose internally, or for appearance externally, so the wall intervening between the top of these and the sill of the gables is a good field for some decorative treatment, confined to the bays, so as to assist in separating them from the straight wall which forms the background to them.

So far we have treated our building only as a private house. Without altering its general scale and shape, we may suggest something entirely different from a private house. On Fig. 13, we have tried to give a municipal appearance to it, as if it were the Guild-Hall of a small country town. The plain basement and the wide principal doorway, and the row of three very large equal-spaced windows above, render it unquestionable that this is a building with a low ground story, and one large room above; a certain "public building" effect is given to it by the large and enriched cornice with balustrade above and panelling below, and by the accentuation of the angles by projecting piers and by the turrets over them, which give it quite a different character from that of a private house. If, on the other hand, the building were the Free Library and Reading-room of the same small country town, we should have little doubt of this, if we saw it as in Fig. 14, with the walls all blank (showing that they are

wanted for ranging something against, and cannot be pierced for windows), and windows only in the upper portion. Similarly if we want to build it as the country Bank, we should have to put the large windows on the ground floor, Bank clerks wanting plenty of light, and the ground story being always the principal one; and we might indulge the humour of giving it a grim fortress-like strength by a rusticated plinth (*i.e.* stones left or worked rough and rock-like), and by very massive piers between the windows, and a heavy cornice over them; the residential upper floor forming a low story subordinate to the bank story. It is true this would not satisfy the average banker, who always wants classic pilasters stuck against the walls; that being his hereditary idea of Bank expression in architecture.

Now if we proceed to take to pieces the idea of architectural design, and consider wherein the problem of it consists, we shall find that it falls into a fourfold shape. It consists first in arranging the plan; secondly, in carrying up the boundary lines of this plan vertically in the shape of walls; thirdly, in the method of covering in the space which we have thus defined and enclosed; and fourthly, in the details of ornamentation which give to it the last and concluding grace and finish. All building, when it gets beyond the mere wall with which we began, is really a method of covering in a space, or, if we may put it so, a collection of spaces, marked out and arranged for certain purposes. The first thing that the architect has to do is to arrange these spaces on the ground so that they may conveniently meet the necessary requirements of the building. Convenience and practical usefulness come first; but in any building which is worth the name of architecture, something more than mere convenience has to be kept in mind, even in the arrangement of the plan upon the site. It is to be a combination of convenience with effectiveness of arrangement.

We shall probably find that some one compartment of the plan is of paramount importance. We have to arrange the interior so that this most important compartment shall be the climax of the plan. The entrance and the other subsidiary compartments must be kept subordinate to it, and must lead up to it in such a manner that the spectator shall be led by a natural gradation from the subsidiary compartments up to the main one, which is the centre and *raison d'être* of the whole—everything in the lines of the plan should point to that. This is the great *crux* in the planning of complicated public buildings. A visitor to such a building, unacquainted with it previously. ought to have no difficulty in finding out from the disposition of the interior which are the main lines of route, and when he is on the line leading up to the central feature of the plan. There are public buildings to be found arranged on what may be called the "rabbit-warren" system, in which perhaps a great number of apartments are got upon the ground, but which the visitor is obliged laboriously to learn before he can find his way about them. That is not only inconvenient, but inartistic planning, and shows a want of logic and consideration, and, in addition to this, a want of feeling for artistic effect. The building may be just as convenient when you once know its dodges, but it does not appear so, and it loses the great effect of direct vista and climax. An able architect, who had given much thought to a plan of a large building of this kind, said to me, in showing me his plan, with a justifiable gratification in it, "It has cost me endless trouble, but it *is* a satisfaction to feel that you have got a plan with backbone in it." That is a very good expression of what is required in planning a complicated building, but few outsiders have any notion of the amount of thought and contrivance which goes to the production of a plan "with backbone;" a plan in which all the subordinate and merely practical

departments shall be in the most convenient position in regard to each other, and yet shall all appear as if symmetrically and naturally subordinate to the central and leading feature; and if the public had a little more idea what is the difficulty of producing such a plan, they would perhaps do a little more justice to the labours of the man who contrives the plan, which, no doubt, may appear to them a very easy business, because the very characteristic of a really good plan is that it should appear as if it were quite a natural and almost inevitable arrangement. Just as it is said in regard to literature, that easy writing is hard reading, so, in regard to planning, it is the complicated and "rabbit-warren" plans that are the easiest to make, because that is just doing what you please; it is the apparently perfectly simple and natural plan which springs from thought and contrivance.

Then there is the next step of raising the walls on the plan, and giving them architectural expression. This must not be thought of as an entirely separate problem, for no true architect will ever arrange a plan without seeing generally, in his mind's eye, the superstructure which he intends to rear upon it; but the detailed treatment of this forms a separate branch of the design. Then comes the third and very important problem—the covering in of the space. Next to the plan this is the most important. All building is the covering over of a space, and the method of covering it over must be foreseen and provided for from the outset; it largely influences the arrangement of the plan. If there were no roofing, you could arrange the walls and carry them up pretty much as you chose; but the roofing of a large space is another matter; it requires extra strength at certain points, where the weight of the roof is concentrated, and it has to be determined beforehand whether you will employ a

method of roofing which exercises only a vertical pressure on the walls, like the lid of a box, or one which, like an arch, or a vault, or a dome, is abutting against the walls, and requires counterforts to resist the outward thrust of the roof. We shall come upon this subject of the influence of the roof on the design of the substructure more in detail later on. Then, if the plan is convenient and effective, the walls carried up with the architectural expression arising from the placing and grouping of the openings, the proper emphasizing of the base and the cornice and the horizontal stages (if any) of the structure, and the roof firmly and scientifically seated on the walls: after all these main portions of the structure are designed logically and in accordance with one another and with the leading idea of the building, then the finishing touches of expression and interest are given by well-designed and effective ornamental detail. Here the designer may indulge his fancy as he pleases as far as the nature of the design is concerned; but not, be it observed, as far as its position and distribution are concerned. There the logic of architecture still pursues us. We may not place ornament anywhere at haphazard on a building simply because it looks pretty; at least, to do so is to throw away great part of its value. For everything in architectural design is relative; it is to be considered in relation to the expression and design of the whole; and ornament is to be placed where it will emphasize certain points or certain features of the building. It must form a part of the grouping of the whole, and be all referable to a central and predominating idea. A building so planned, built, and decorated, becomes in fact what all architecture—what every kind of artistic design should be—an organised whole, of which every part has its relation to the rest, and from which no feature can be removed without

impairing the unity and consistency of the design. You may have a very good, even an expressive building, with no ornament at all if you like, but you may not have misplaced ornament; that is only an excrescence on the design, not an organic portion of it.

It may here be of use to those who are unacquainted with architectural procedure in delineating architecture by geometrical drawings, to take the opportunity of illustrating very briefly the philosophy of "elevations, plans, and sections,"

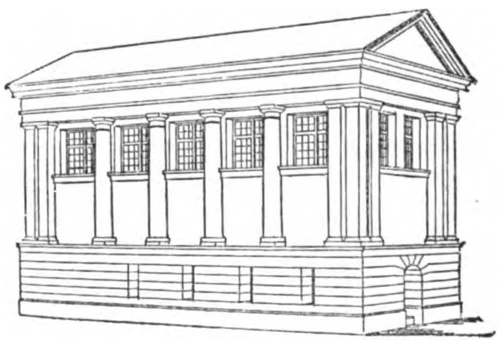
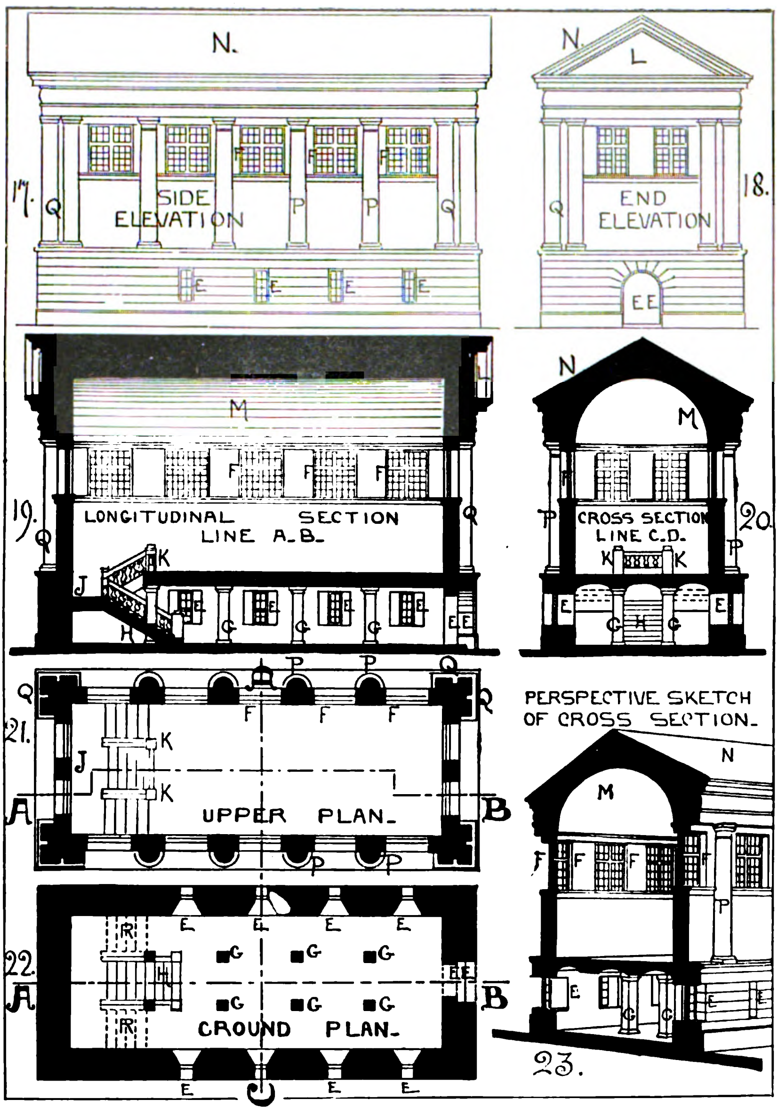


Fig. 16.

which many non-professional people seem to find such difficulty in understanding. A simple model of a building, like that in Fig. 16, will serve the purpose, as the principle is the same in the most complicated as in the simplest building. It must be remembered that the object of architectural drawings on the geometrical system is not to show a *picture* of the building, but to enable the designer to put together his design accurately in all its parts, according to scale, and to convey intelligible and precise information to those who have to erect the building. A perspective drawing like Fig. 16 is of no use for this purpose. It shows generally what the

design is, but it is impossible to ascertain the size of any part by scale from it, except that if the length of one line were given it would be possible, by a long process of projecttion and calculation, to ascertain the other sizes. The *rationale* of the architect's geometrical drawings is that on them each plane of the building (the front, the side, the plan, etc.) is shown separately and without any distortion by perspective, and in such a manner that every portion is supposed to be opposite to the eye at once. Only the width of any object on one side can be shown in this way at one view; for the width of the return side you have to look to another drawing; you must compare the drawings in order to find out those relative proportions which the perspective view indicates to the eye at a glance; but each portion of each side can be measured by reference to a scale, and its precise size obtained, which can only be guessed at roughly from the perspective drawing. Thus the side of the model is shown in Fig. 17, the end in Fig. 18; the two together give the precise size and proportions of everything outside to scale, except the projection of the pilasters; this has to be got at from the plan and section. Everything being drawn on one plane, of course surfaces which are sloping on one elevation are represented as flat in the other; for instance, on Fig. 18, the raking line of the sloping roof is shown at N, so we know the slope of the roof, but we do not know to what length it extends the other way. This is shown on Fig. 17, where the portion showing the roof is also marked N, and it will be seen that the surface which is sloping in Fig. 18 is seen in the side elevation only as a space between a top and bottom line; we see the length of the roof here, and its height, but for its slope we go to the end elevation. Neither elevation tells us, however, what is inside the building; but the cross section (Fig. 20) shows us that it has an arched ceiling, and two stories,


17.
SIDE ELEVATION
18.
END ELEVATION
19.
LONGITUDINAL SECTION
LINE A-B-
20.
CROSS SECTION
LINE C.D.
21.
UPPER PLAN-
22.
GROUND PLAN-
PERSPECTIVE SKETCH
OF CROSS SECTION-
23.

Figs. 17-23.

a lower and a higher one. The section is the building cut in half, showing the end of the walls, the height and depth of the window openings, the thickness of the floor, etc.; and as all parts which are opposite the eye are shown in the drawing, the inside of the cross wall at the end of the building is shown as a part of the section drawing, between the sectional walls. In Fig. 23 the section is sketched in perspective, to show more clearly what it means. Another section is made lengthways of the building (Fig. 19). It is customary to indicate on the plan by dotted lines the portion through which the section is supposed to be made; thus on the plans the lines A B and C D are drawn, and the corresponding sections are labelled with the same lines. As with the elevation, one section must be compared with another to get the full information from them. Thus in Fig. 20, the ceiling, M, is shown as a semicircle; in Fig. 19, it is only a space between the top and bottom line; it is, certainly, shaded here to give the effect of rotundity, but that is quite a superfluity. On Fig. 20 the height of the side windows is shown at F, and the thickness of the wall in which they are made; in Fig. 19 (F) their width and spacing are shown. In Fig. 20 some lines drawn across, one over the other, are shown at H; these are the stairs, of which in this section we see only the fronts, or "risers," so that they appear merely as lines (showing the edge of each step) drawn one over the other. At H on the plan, Fig. 22, we again see them represented as a series of lines, but here we are looking down on the top of them, and see only the upper surfaces, or "treads," the edges again appearing as a series of lines. At H on the longitudinal section, we see the same steps in section, and consequently their actual slope, which, however, could have been calculated from Figs. 20 and 22, by comparing the heights shown in section with the width shown in plan. On the elevation (Fig. 17), the pillars or pilasters (P) along the sides might, for all we can

tell from the elevation, be flat strips; the upper plan (Fig. 21) shows us that they are really half-round columns. So again in regard to the columns (G) supporting the floor; the two sections give us the height of these and their spacing in each direction, but do not show us whether they are round or square; the plan (Fig. 22) shows us that they are square. The plan of a building is merely a horizontal section, the shape of the lower portion of the walls with the upper portion lifted off, the eye looking down on it from above. In Fig. 24 is given

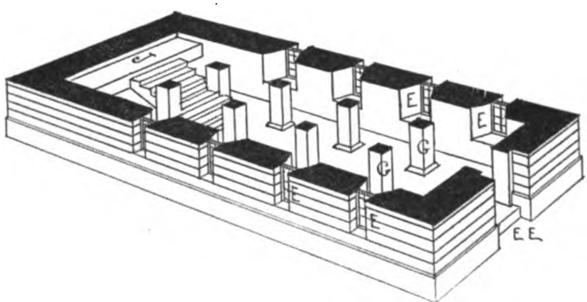


Fig. 24.

a sketch of the ground plan as it would appear if viewed in perspective; the tops of the walls are coloured black, and represent the black wall-blocks of the plan as they would appear in perspective; if the reader compares Fig. 24 with Fig. 22, he will, I think, understand exactly what a plan means.

Returning for a moment to the subject of the relation between the plan and the exterior design, it should be noted that the plan of a building being practically the first consideration, and the basis of the whole design, the latter should be in accordance with the principle of disposition of the plan. For example, if we have an elevation (Fig. 25) showing two wings of similar design on either side of a centre, arranged so as to convey the

idea of a grand gallery, with a suite of apartments on either side of similar importance—if, as shown here, the one side only of the plan contains such a suite, and the opposite side is in reality divided up into small and inferior rooms, filled in as well as may be behind the architectural design, the whole design is in that case only a blind or screen, giving a false exterior symmetry to a building which is not so planned. This is an extreme case (or might be called so if it were not actually of pretty frequent occurrence); but it illustrates in a broad sense a principle

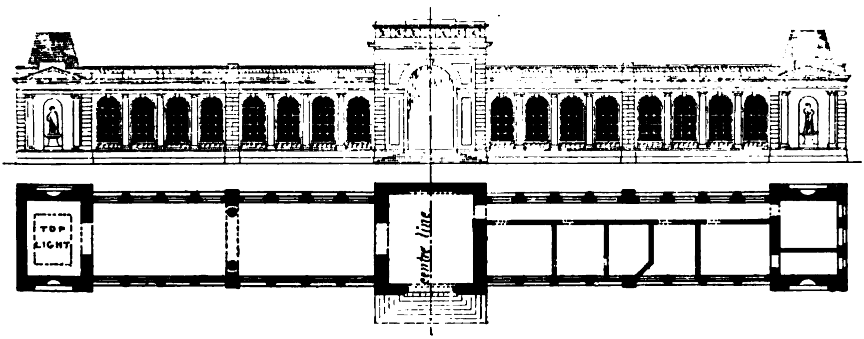


Fig. 25.

which must be carried out in all cases, if the external architecture is to be a real expression of the facts of the building.

In this chapter, which is concerned with general principles, a word may fittingly be said as to the subject of *proportion*, concerning which there are many misapprehensions. The word may be, and is, used in two senses: first, in regard to the general idea suggested in the words "a well-proportioned building." This expression, often vaguely used, seems to signify a building in which the balance of parts is such as to produce on the eye an agreeable impression of completeness and repose. There is a curious kind of popular fallacy in regard to this subject,

illustrated in the remark which used to be often made about St. Peter's, that "it is so well-proportioned that you are not aware of its great size," etc.; an absurdity of criticism which has been slain over and over again, but continues to revive from time to time. The fact that this building does not show its size is true; but the inference drawn is the very reverse of the truth. One object in architectural design is to give full value to the size of a building, even to magnify its apparent size; and St. Peter's does not show its size because it is *ill*-proportioned, being merely like a smaller building with all its parts magnified; hence the deception to the eye, which sees details which it is accustomed to see on a smaller scale, and underrates their actual size, which is only to be ascertained by deliberate investigation. This confusion as to scale is a weakness inherent in the classical forms of columnar architecture, in which the scale of all the parts is always in the same proportion to each other, and to the total size of the building, so that a large Doric temple is in most respects only a small one magnified. In Gothic architecture the scale is the human figure, and a larger building is treated, not by magnifying its parts, but by multiplying them. Had this procedure been adopted in the case of St. Peter's, instead of merely treating it with a columnar order of vast size, with all its details magnified in proportion, we should not have the fault to find with it that it does not produce the effect of its real size.

In another sense, the word "proportion" in architecture refers to the system of designing buildings on some definite geometrical system of regulating the sizes of the different parts. The Greeks certainly employed such a system, though there are not sufficient data for us to judge exactly on what principle it was carried out. In regard to the Parthenon, and some other Greek buildings, the late Mr. Watkiss Lloyd worked out

a very probable theory, which will be found stated in a paper in the "Transactions of the Institute of British Architects."

Vitruvius gives elaborate directions for the proportioning of the size of all the details in the various "Orders" into which classical architecture is divided (see Chapter II.); and though we may doubt whether his system is really a correct representation of the Greek one, we can have no doubt that some such system was employed by them. Various theorists have endeavoured to show that the system has prevailed of proportioning the principal heights and widths of buildings in accordance with geometrical figures, triangles of various angles especially; and very probably this method has from time to time been applied, in Gothic as well as in classical buildings. This idea is open to two criticisms, however. First, the facts and measurements which have been adduced in support of it, especially in regard to Gothic buildings, are commonly found on investigation to be only approximately true; the diagram of the section of the building has nearly always, according to my experience, to be "coaxed" a little in order to fit the theory; or it is found that though the geometrical figure suggested corresponds exactly with some points on the plan or section, these are really of no more importance than other points which might just as well have been taken; the theorist draws our attention to those points in the building which correspond with his geometry, and leaves on one side those which do not. Now it may certainly be assumed that any builders intending to lay out a building on the basis of a geometrical figure, would have done so with precise exactitude, and that they would have selected the most important points of the plan or section to govern the geometrical spacing. In illustration of this point, I have given (Fig. 26) a skeleton diagram of a Roman arch, supposed to be set out on a geometrical

figure.* The centre of the circle is on the intersection of lines connecting the outer projection of the main cornice (A A) with the perpendiculars from those points on the ground line (B B). The centre of this imaginary circle is also the centre of the actual half-circle of the archway itself. But the upper part of the imaginary circle cuts the middle of the upper cornice at C. If the structure were to be regarded as set out in reference to this circle, it should certainly have given the most important line—the top line, of the upper cornice, not an inferior and less important line.

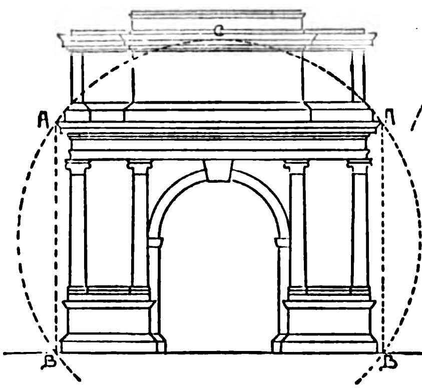


Fig. 26.

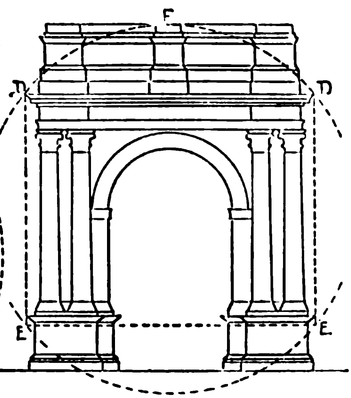


Fig. 27.

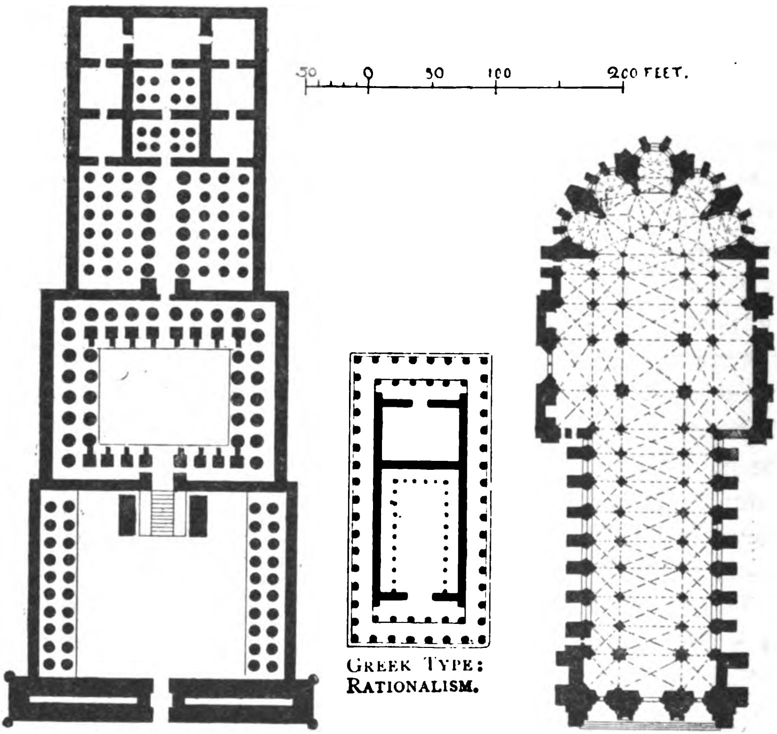
On the other hand, in the example (Fig. 27), taken from the same work, it will be seen that the circle drawn through the ends of the main cornice, at its greatest projection, does cut the highest line of the upper story at F; but the perpendiculars drawn from the projection of the main cornice at D, cut the circle below at E E, not at the ground line, but at a point which does not coincide with anything whatever in the architectural design, and merely draws an arbitrary line across it. And

* From the Chapter on "Principles of Proportion," in Gwilt's *Encyclopedia of Architecture.*

that is pretty much the case with all these proportion theories (except, perhaps, in regard to Greek Doric temples); they are right as to one or two points of the building, but break down when you attempt to apply them further. It is exceedingly probable that many of these apparent geometric coincidences really arise, quite naturally, from the employment of some fixed measure of division in setting out buildings. Thus, if an apartment of somewhere about 30 feet by 24 feet is to be set out, the builder employing a foot measure naturally sets out exactly 30 feet one way and 24 feet the other way; it is easier and simpler to do so than to take chance fractional measurements. Then comes your geometrical theorist and observes that "the apartment is planned precisely in the proportion of five to four;" so it is, but it is only the philosophy of the measuring-tape, after all. Secondly, it is a question whether the value of this geometrical basis is so great as has sometimes been argued, seeing that the results of it in most cases cannot be judged by the eye. If, for instance, we were to go into any large room which was said to be nearly in the proportion of seven in length to five in width, I do not think most persons could tell by looking at it whether it were truly so or not; or even, if it were a foot out one way or the other, in which direction the excess lay; and if this be the case, the architectural advantage of such a geometrical basis must be rather imaginary than real.

Having spoken of plan as the basis of design, I may conclude this chapter by further illustrating what has already been suggested in passing, and what has never to my knowledge been prominently brought forward by any writer on architecture, that the plan itself, apart from any consideration of what we may build up upon it, is actually a form of artistic thought, of architectural poetry, so to speak. If we take

three such plans as those shown in Fig. 28, typical forms respectively of the Egyptian, Greek, and Gothic plans, we certainly can distinguish a special imaginative feeling or tendency in each of them. In the Egyptian, which I have



GREEK TYPE: RATIONALISM.

EGYPTIAN TYPE: MYSTERY.

Fig. 28.

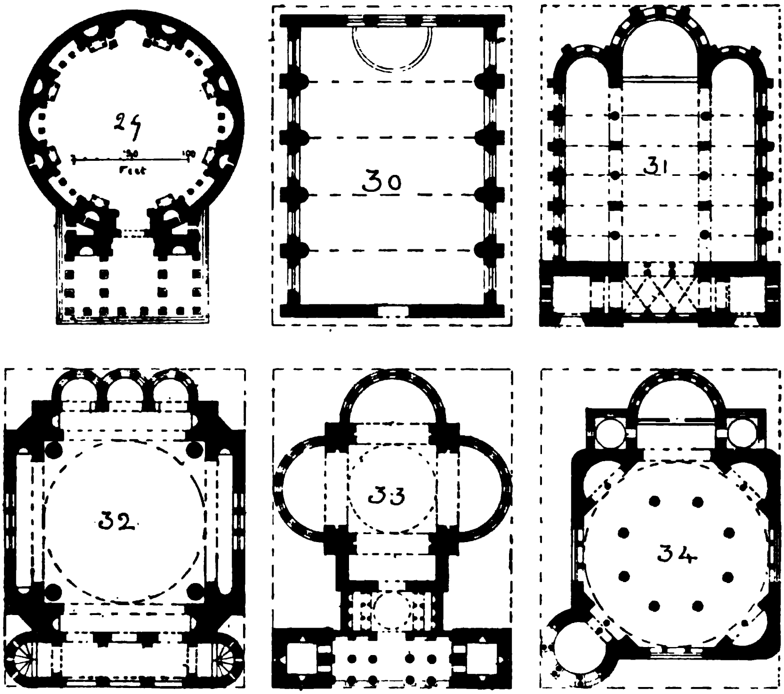
GOTHIC TYPE: ASPIRATION.

called the type of "mystery," the plan continually diminishes as we proceed inwards; in the third great compartment the columns are planted thick and close so as to leave no possibility of seeing through the building except along a single avenue of columns at a time; the gloom and mystery of a deep forest are

in it, and the plan finally ends, still lessening as it goes, in the small and presumably sacred compartment to which all this series of colonnaded halls leads up. In the Greek plan there is neither climax nor anti-climax, only the picturesque feature of an exterior colonnade encircling the building and surrounding a single oblong compartment; it is a rationalistic plan, aiming neither at mystery nor aspiration. In the Gothic plan (that of Rheims) we have the plan of climax or aspiration; as in the Egyptian, we approach the sacred portion through a long avenue of piers; but instead of narrowing, the plan extends as we approach the shrine. I think it will be recognised, putting aside all considerations of the style of the superstructure on these plans, that each of them in itself represents a distinct artistic conception. So in the plan of the Pantheon (Fig. 29), this entrance through a colonnaded portico into a vast circular compartment is in itself a great architectural idea, independently of the manner in which it is built up.

We may carry out this a little further by imagining a varied treatment on plan of a marked-out space of a certain size and proportion, on which a church of some kind, for instance, is to be placed. The simplest idea is to enclose it round with four walls as a parallelogram (Fig. 30), only thickening the walls where the weight of the roof-timbers comes. But this is a plan without an idea in it; the central or sacred space at the end is not expressed in the plan, but is merely a railed-off portion of the floor; the entrance is utterly without effect as well as without shelter. If we lay out our plan as in Fig. 31, we see that there is now an idea in it. The two towers, as they must evidently be, form an advanced guard of the plan, the recessed central part connecting them gives an effective entrance to the interior; the arrangement in three aisles gives the effect of length, the apse at the end encloses and expresses the *sacrarium*, which is the

climax and object of the plan. The shape of the ground, however, is not favourable to the employment of a long or avenue type of plan, it is too short and square; let us rather try a plan of the open area order, such as Fig. 32. This is based



Figs. 29–34.

on the short-armed Greek cross, with an open centre area; again there is an "advanced guard" in the shape of an entrance block with a porch; and the three apses at the end give architectural emphasis to the *sacrarium*. Fig. 33 is another idea, the special object of which is to give an effect of contrast between the entrance, approached first through a colonnaded portico, then

through an internal vestibule, lighted from above, and flanked by rows of small coupled columns; then through these colonnaded entrances, the inner one kept purposely rather dark, we come into an interior expanding in every direction; an effect of strong contrast and climax. If our plot of ground again be so situated that one angle of it is opposite the vista of two or more large streets (Fig. 34), there and nowhere else will be the salient angle, so to speak, of the plan, and we can place there a circular porch—which may, it is evident, rise into a tower—and enter the interior at the angle instead of in the centre; not an effective manner of entering as a rule, but quite legitimate when there is an obvious motive for it in the nature and position of the site. A new feature is here introduced in the circular colonnade dividing the interior into a central area and an aisle. Each of these plans might be susceptible of many different styles of architectural treatment; but quite independently of that, it will be recognised that each of them represents in itself a distinct idea or invention, a form of artistic arrangement of spaces, which is what "plan," in an architectural sense, really means.

Recurring to what has been already said as to the planning of public buildings, in which practical convenience has to go hand in hand with architectural effect, let me add one or two actual examples of good planning, which will serve to show, more clearly than theoretical maxims, what are the characteristics of a good plan of this description. The first (Fig. 35) is from a competition design for the municipal buildings at Sheffield, which the author, Mr. James Lindsay, has kindly permitted me to use as an illustration. The first-floor plan of this building was to provide for a set of state apartments arranged *en suite*, a Council-Chamber and ante-room, six Committee-rooms, the Town Clerk's offices, and the Borough Surveyor's office. The site was of an uneven shape, bounded on the south by the dotted

line shown on the upper side of the plan. The state apartments, which should, of course, find place on the principal architectural frontage, are so placed, forming a façade across the principal front of the building. The Mayor's parlour, which should be a sitting-room for comfort, as well as for state, is divided from the large reception-room by a small ante-room, and has its own

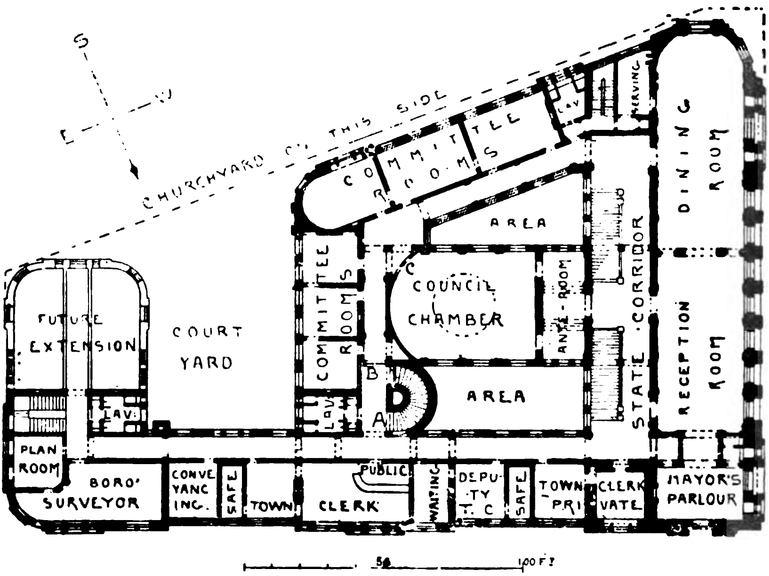


Fig. 35.

lavatory attached to it, and a small lobby interposed between it and the corridor. The Council-Chamber and Committee-rooms imperatively demand privacy and a quiet situation, undisturbed by the noise of traffic. Accordingly the Council-Chamber is placed in the centre, lighted from a dome over it (indicated by the dotted circle) as well as from the side windows. The Committee-rooms are placed towards the side bounded by a large churchyard, which ensures absence from traffic, and

towards the principal courtyard of the building. They are all grouped together, opening out of their own corridor, and by a door (C) this corridor is in immediate communication with the Council-Chamber, with which the Committees would necessarily require to be in frequent communication. The position of the Town Clerk's offices is equally well chosen. The Town Clerk's department in such a building is the centre of the whole work of the establishment. The Town Clerk's private office is here placed adjoining the Mayor's parlour, so that these two leading functionaries can easily communicate, and the door of his *sanctum* appropriately faces the state corridor, giving it a certain distinction of position. The Town Clerk's department must be in a position for ready communication with the Committee-rooms, and accordingly the door of the Town Clerk's public office immediately faces the end of the Committee-room corridor. It is also essential that the public should have ready and direct access to this office, and should have no difficulty in finding it; accordingly the door of this office is close to the head of the public business staircase (A); the public being shut out from the Committee-room corridor by the doors at B. The Borough Surveyor must be not far off, as he must have ready communication with the Town Clerk's department on questions affecting the management or purchase of property. His room is at the end of the Town Clerk's corridor, and the principal room, the drawing office, has a north light, which is indispensable for comfort in drawing. Thus it will be seen that all these rooms are arranged and grouped with special reference to the most convenient discharge of all the work with which they are concerned, and that is what good planning means. The two areas for light, which are not very large, it will be seen are only absolutely depended on for lighting corridors (for in the Council-Chamber they are only an assistance to the top light, which is

the principal one), so that no rooms are dependent on an enclosed area for light and ventilation, which is an important matter from a sanitary point of view. The only criticism that might be made is that the door of the lavatory opposite staircase A, intended, of course, for the staff and not for the public, should not have faced the top of the staircase; it would be possible to alter this without interfering with the rest of the plan. In the main, however, this is a remarkably perfect example of convenient and logical planning.

The other example (Fig. 36) is a plan on a larger scale, and which, while it illustrates the arrangement of rooms for practical convenience, illustrates also the manner in which architectural genius may be evinced in planning. This plan (reproduced from an engraving in *The Builder* of September 2, 1871) was also a competition plan, submitted in an important competition for the Birmingham municipal buildings, by Mr. Lynn of Belfast, an architect of genius, who has unfortunately never had any of the great opportunities which have sometimes fallen to architects of far inferior gifts. The well-known Birmingham Town Hall, the plan of which is seen on the left, was of course already in existence. The lower boundary of the site actually marked out for the municipal buildings, in the instructions to competitors, followed pretty nearly the dotted line (A) which I have inserted (from memory) on the plan: a line oblique to the Town Hall. Mr. Lynn, alone among the competitors, saw that by a slight alteration of the boundaries, for which there was room on the ground, the building could be aligned so as to be in parallelism with the existing Town Hall, which could be connected with the state apartments of the new building by a bridge, so that on great occasions the Town Hall could be placed *en suite* with the reception and dining-rooms, making a splendid climax to them; while, externally, the bridge used to connect them

could not fail to be a most picturesque architectural addition to the group. Never was there a happier stroke of architectural

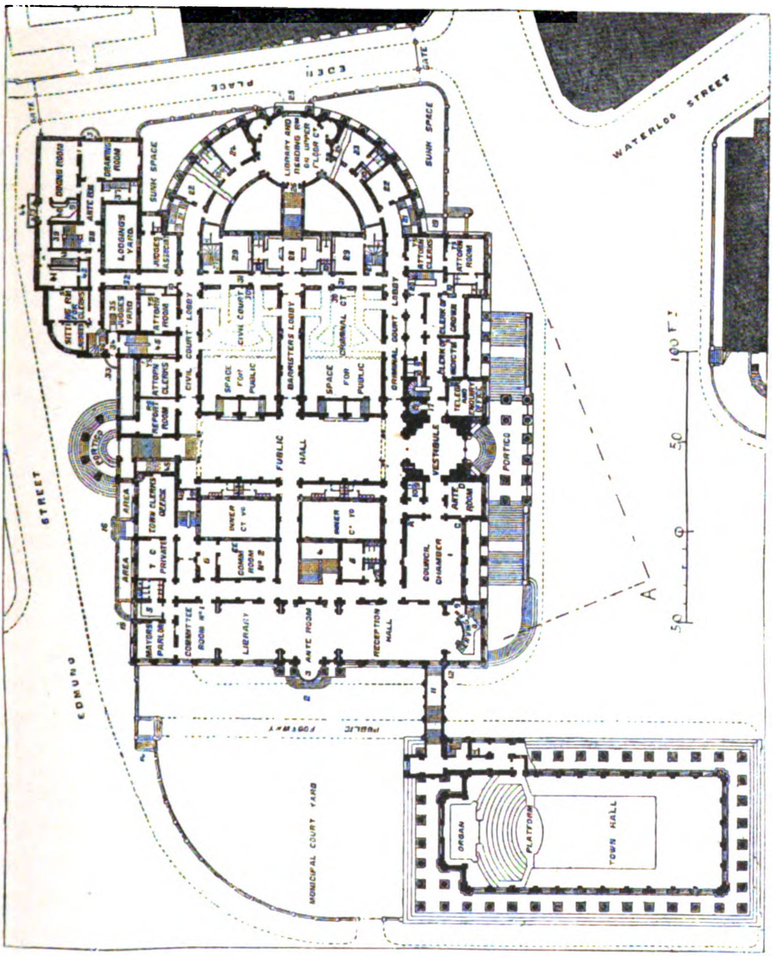


Fig. 36.

genius than this; and the same genius is shown throughout the plan for the new buildings, in the fine combination of practical convenience with architectural effect, and especially

in the grand semicircular sweep with which rooms and corridors are carried round at the further end of the building. This plan peculiarly illustrates what has previously been said as to the possibility of showing architectural design and genius in *plan* alone, independently of elevation; for, owing probably to other engagements, the author had no time to finish any part of his design, and merely sent one or two rough outline elevations; yet every competent critic who examined the numerous drawings submitted on the occasion, recognised this plan as the masterwork of the competition. The Birmingham authorities, though they felt precluded by the conditions of the competition from selecting an unfinished design, offered to purchase from Mr. Lynn the property in his plan; an offer which was, I believe, declined. No use, therefore, was made of it (to the loss of Birmingham), and it has remained among those great and original architectural conceptions which have been destined only to be admired on paper.

CHAPTER II.

TRABEATED ARCHITECTURE.

IN the previous chapter, reference was made to the influence of the roofing of a building upon the substructure, and it was pointed out generally how the walls must be arranged and massed in reference to the manner and the positions in which the principal weight of the roof was to come on them. Considering this more specially, we may say that all roofing may be classed constructively under two systems: that which consists in covering a space by a beam laid across from one point of support to another, and which therefore exercises a simple vertical pressure on the walls, and that which consists in an arrangement of stones or other similar material in the form of an arch, which exercises an outward thrust upon the walls in a manner to be considered in our next chapter. In Mr. Garbett's little book on the "Principles of Design in Architecture," a work containing more real thought on the subject in proportion to its size than any other architectural treatise I am acquainted with, it has been attempted to show that there is a third principle, which the author thought was destined to produce the architecture of the future, viz., the arch with its points of springing confined by a cross tie of iron or other tensile material, so that the tie-rod holds the arch together (as shewn in the accompanying diagram), and receives the thrust of it, which would otherwise be conveyed to the walls (Fig. 37). I

think, however, that we can hardly accept this view of the arch and a tie as a separate constructive principle in architecture, influencing style; because in reality such an arch, so far as its bearing on the substructure is concerned, is only a more complex form of beam, exercising a purely vertical pressure on the walls; the outward thrust of the arch and the inward pull of the tie-rod are balanced at the iron abutments or "skew-backs," A A, neither strain being conveyed to the walls, which receive nothing but the vertical pressure of the whole construction, exercised at A A, as indicated by the arrows. There are other complex forms of beams, which all come under the same category in an archi-

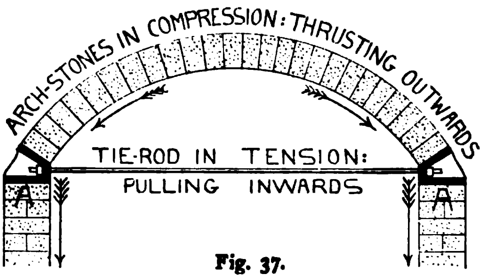


Fig. 37.

tectural sense, being a method of framing timbers or other materials together so as to mutually support each other, and to bridge over a larger space with less bulk of material than could be achieved by merely using the material in the simple form of a single beam. This is accomplished by the principle of the *truss*, which is so important a feature in roofing construction, and in bridging over spaces generally, that a brief explanation of it will be desirable before proceeding with our subject.

If we suppose a set of stone lintels laid across from one column to another, as A, Fig. 38 (which is the typical Greek construction), the pressure of the wall above them, which

operates in the same way as a weight hung to them and pulling them down, is acting directly across the line of the longer axis of the lintel, tending to break it in two across the middle; in other words, it is subjected to what is spoken of as "cross strain." This is the most disadvantageous strain to which a piece of material of the shape and consistency of a stone lintel can be subjected; in plain words, it is more easily broken that way than any other; and though the strain upon it is much less when the pressure is distributed over the whole surface of the lintel, instead of being applied at one point only, as in the diagram, still a stone lintel subjected to that kind of pressure can only carry over a comparatively small space, and in columnar architecture of this type the distance

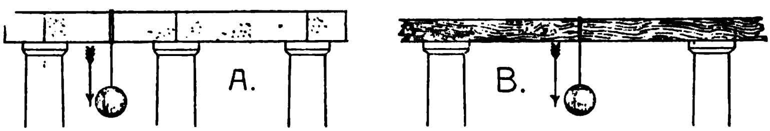


Fig. 38

between the columns is limited to the small distance which can be bridged over by a stone lintel. If we take a wooden lintel (B) we can carry over a larger space, because wood, being a fibrous material, has more cohesion, and is less easily rent asunder by cross strain, than a granular material like stone. This fact is alluded to by Vitruvius as influencing the architectural arrangement of temples in which wooden lintels are used, and in which the columns accordingly were to be spaced farther apart. In roofing over large spaces, however, we can get no beam of timber which will carry over the whole space without bending with its own weight, and if we could procure pieces of timber of such size and depth as not to do so, they would be enormously heavy and unwieldy. If we take

two pieces and let them lean against each other in the centre, their feet abutting against the wall (Fig. 39), we get a step farther, but we have now the disadvantage that the weight of the two beams meeting at A is transformed into a pressure out-

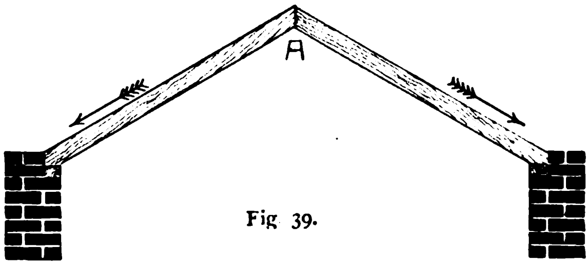


Fig. 39.

wards against the walls, in the direction shown by the arrows, tending to push the walls out, and thereby let the centre, A, drop. If, instead of fixing the beams directly upon the walls, we let their feet into a horizontal beam (B, Fig. 40), we have got

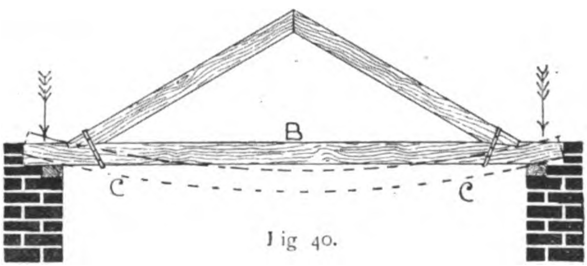


Fig. 40.

rid of the outward thrust on the walls, and the whole now only acts vertically, in the same way as the ordinary beam, but we have still the same tendency of the cross-beam to bend by its own weight, in the direction of the dotted lines at C C;* and the only advantage we have so far got is that we have secured the

* The bending curve is, of course, much exaggerated in order to render the meaning clear. A bend which would hardly be perceptible on a diagram of this size would nevertheless tend to push out and unsettle the walls.

sloping form necessary for a roof, without its exercising the same outward pressure on the walls as in Fig. 39. Still, when B begins to sink, the tendency will be again for the construction to sink inside the walls, and press them outwards. But if instead of merely letting the two sloping pieces meet at the top, we place between them a vertical piece (D, Fig. 41), so cut that it shall be clipped between the tops of the two sloping pieces,

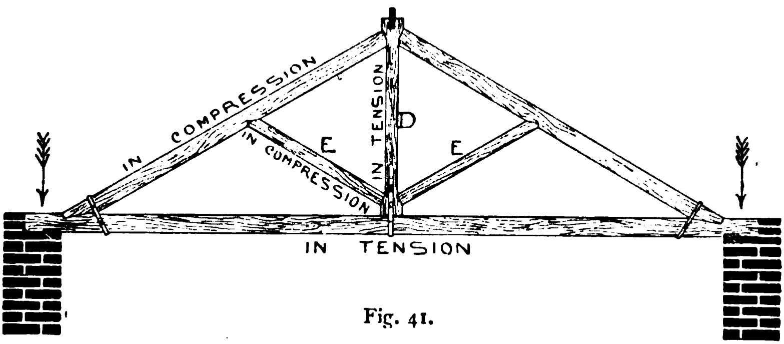


Fig. 41.

we can then, by means of this vertical piece (called the "king-post"), hold up the middle of the horizontal beam (called the "tie-beam" and give it support against sinking. All the four pieces in the construction are now, so to speak, jammed together immovably. The feet of the sloping pieces ("rafters") are fixed immovably in the substance of the tie-beam, their heads are jammed together against the king-post, and cannot sink unless the tie-beam sinks, and draws down the whole construction, and the tie-beam is prevented from sinking by being held up to the king-post, to the foot of which it is attached by an iron strap, or other method. The thing is really, it will be observed, an opposition of pressures, which neutralise each other. The sloping rafters are in compression in the direction of their length; the king-post is in a state of tension, or resist-

ance to a pulling strain, holding up in the centre the tie-beam, which at its extremities holds the feet of the rafters. The tie-beam itself is under a tension strain, for it is pulled apart by the thrust of the rafters, thus again opposing the compression strain on the rafters; and though it is still subject to the downward cross strain arising from its own weight, and tending to make it sink in the middle, this is neutralised by a corresponding upward cross strain from the pull of the king-post. When the roof gets to such a size that the rafters in their turn have the same tendency to bend from their own weight, a fresh member is introduced in the shape of the strut (E E), which is in

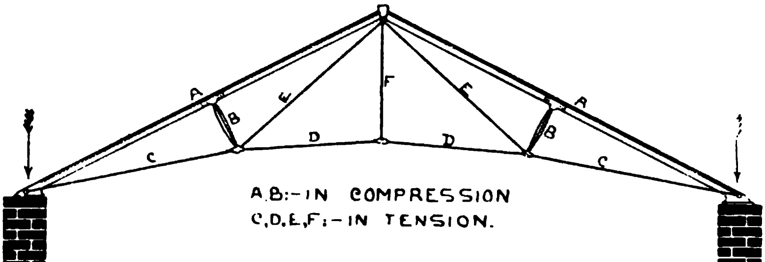


Fig 42.

compression, and is held up by the opposing tension of the king-post on which it is footed, while it holds up the middle of the rafter. The same principle may be carried into further elaboration by the introduction of fresh members of tension and compression as the span gets larger, and the strains on the separate portions more important and complicated, always on the principle of compensating strains in compression and tension to neutralise each other, the forces exercised all acting within and being limited to the structure itself, so that its only action on the walls is by the combined weight of the pieces exercising a simple vertical pressure on the walls. Such a structure, how-

ever complicated in itself, is in its effect on architectural design only a beam—it belongs to trabeated construction (*trabes* = a beam), and so does the much lighter and airy-looking form of the iron truss (Fig. 42), which, far as it is in appearance from the beam in its simpler form, fulfils just the same architectural function of bridging over a space with a covering which exercises only a simple vertical pressure on the walls.

We have then before us two main systems of construction, the beam and the arch, each of which influences differently the arrangement of the plan, and each of which has its influence on style. The arch and its special influence on architectural style will be considered separately in the next chapter; but it may be well at this point to consider for a moment what this expression "style" in architecture, in a general sense, really means. I should define architectural style as implying a uniform system of construction, and the consistent expression of that construction in the design, combined with a consistency in regard to feeling, scale, and general treatment of the details, with suitability to their position. This latter desideratum may in itself go far to create the impression of style, even when the expression of construction is not entirely consistent. The brothers Adam, for instance, who exercised for a time a remarkable influence on the English architecture of their day, and on the "old Colonial" architecture of America (an influence which has of late years unexpectedly revived), may have the credit of having invented or developed, if not quite a style, at least what may be called a sub-style, a treatment of classical detail which was new at the time, and which has the merit of general consistency of manner and feeling in the details. We can illustrate true style, too, in very simple objects of every-day use, if their forms and decorative treatment are based upon construction and use; for the element which we recognise as *style* is evident even in

the harmony and consistency of decorative treatment, so long as there is nothing in the constructive material which clashes with the decorative consistency. But style in architecture is only fully and completely developed when it shows not only decorative consistency of taste, but when a uniform system of construction is adopted throughout the building, and that system is fully and consistently expressed in the design; and where features are admitted which in their apparent expression contradict the real facts of construction, the style is false and incomplete.

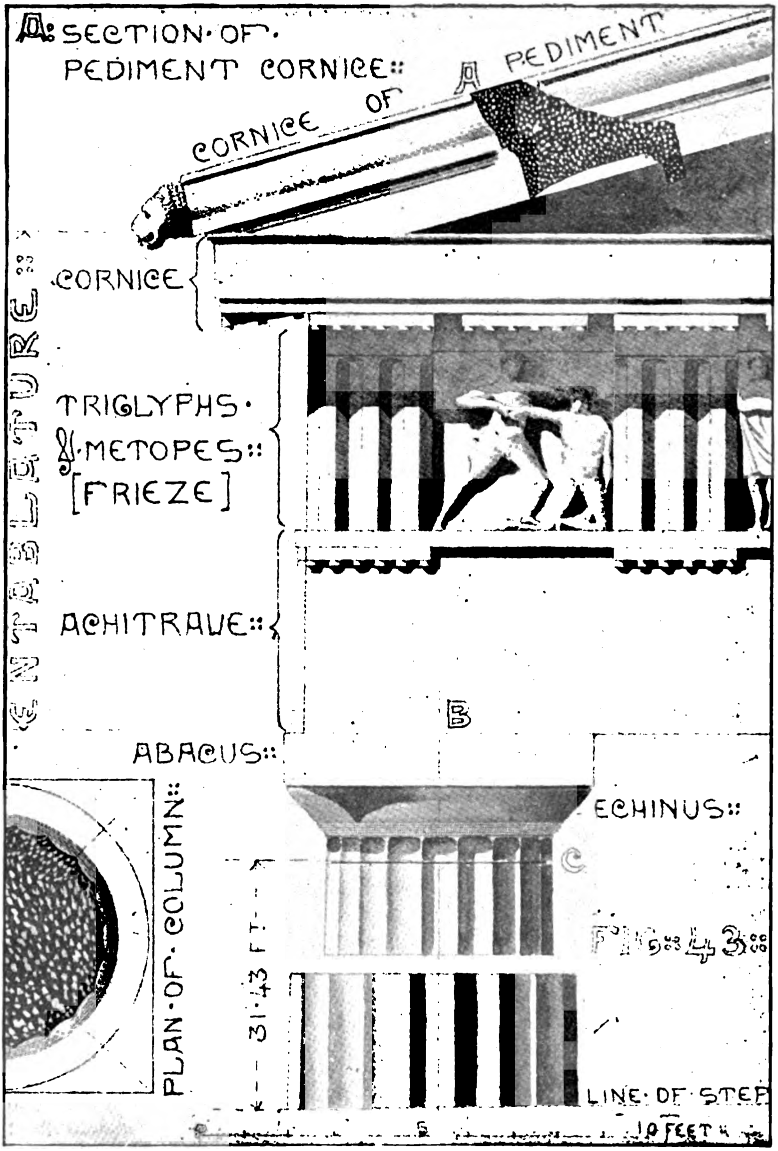
We shall find that these qualities both of true and of false style can be illustrated very fully from various types of existing architecture; and though it might be possible to illustrate the trabeated and arcuated styles by building up a form cf architectural design, based on pure theory, it is much easier, and certainly more instructive, to derive the illustration from styles which have existed, as in that case we not only illustrate the immediate subject in hand, but gain at the same time an insight into the historical relation of various architectural features, which is in itself a matter of considerable interest, and serves to illustrate further the manner in which architectural ideas have been developed. I therefore propose in this and the following chapter to illustrate the architectural treatment of the trabeated and arcuated systems of construction by the consideration of the Greek and Gothic styles, which are respectively the most complete types of architectural treatment of those two systems of construction.

The statical condition, then, of an architectural style founded on the lintel system of construction, is one in which all the strains on the supported portions are cross strains, all the pressures on the supporting portions are simple vertical pressures. Accordingly it is into these two main elements that the design

of Greek architecture is resolved; it consists of the column, which is the support against vertical pressure, and the horizontal portion or "entablature," as it is technically called, which is laid across from column to column. It is true that in the actual Greek architecture there is an apartment within the colonnade, built up with solid walls; but the constructive problem is here just the same; the wall is a continuous column, the roof is the lintel portion resting upon it; and æsthetically, to the Greek mind, the column and its entablature, the outer ordinance of the building, seem to have been practically the architecture, at least as far as the exterior treatment was concerned; the walled portion or *cella* was architecturally, in this respect, of only secondary account.

The main portions of the Greek Doric Order,* which we will first consider, as being the most complete and refined in detail as well as the most dignified in expression of all the colonnaded styles, are shown in Fig. 43, showing the capital and base only of the column, and again in Fig. 44 on a smaller scale, and with the column shown at full length. It consists, as will be seen, of a column of rather massive proportions, with the sides channelled or fluted so as to give

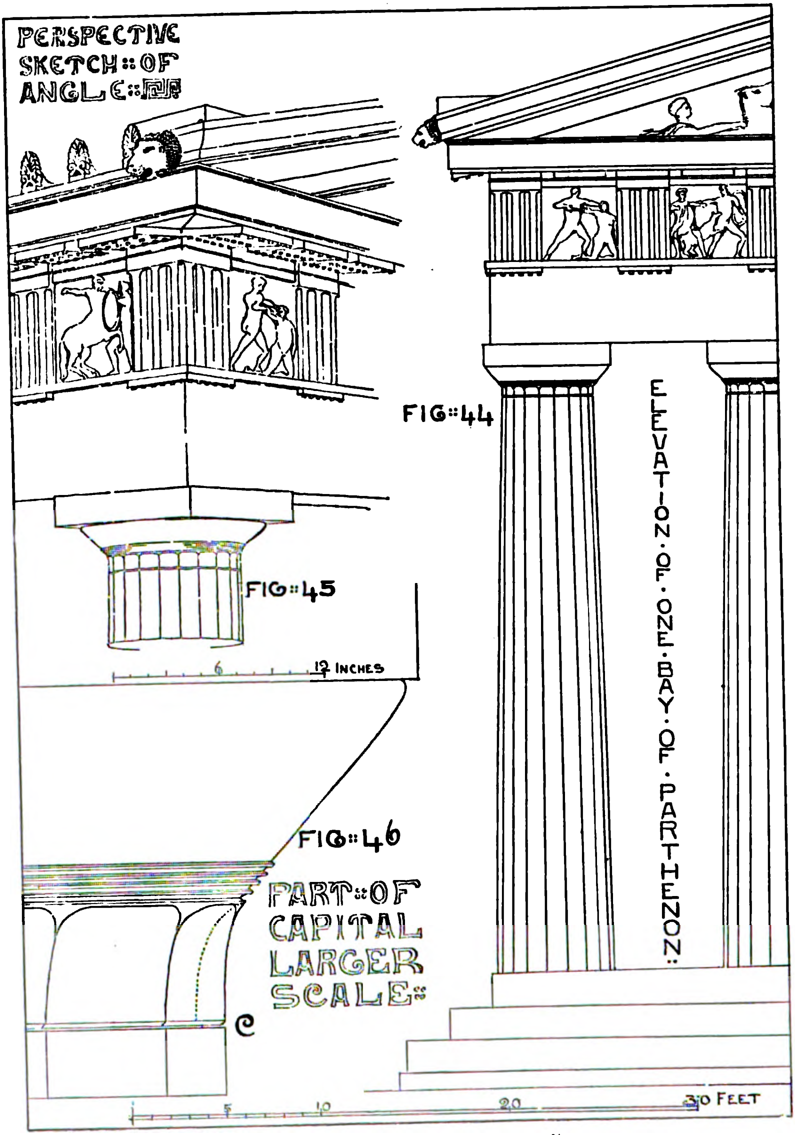
* The word "Order," as used in connection with Classic architecture, signifies the main features of the design, viz. column, capital, and entablature, considered collectively and in relation to one another, as a whole of which the parts are designed and proportioned according to a recognised rule or "order" (Latin *ordo*). The special significance of the phrase will be seen further on. Ruskin's attempt at a new definition, in the "Stones of Venice," where he tells the reader there are really only two Orders—those distinguished by the concave and convex types of capital —is therefore a mere piece of claptrap, in which the word "Order" is arbitrarily used in a sense which it never has borne, and in which it has no logical meaning. There can be no "Order" referable to the treatment of a single feature only; the *ordo* consists in the treatment of all the features in relation to one another.



DORIC ORDER OF THE PARTHENON : DETAILS.

a series of vertical edges and shadow lines on the surface, with a capital consisting of a thick massive "abacus,"* and a moulding of finely-curved outline beneath it; this moulding is separated from the column by a group of horizontal lines formed by a series of small and delicate groovings carried round the neck of the column, and with a subsidiary line formed beneath them a little way down the shaft of the column, by a narrow little nick cut into it and giving a thin black shadow line round it at this point. The entablature, above the column, is divided into three portions, which are labelled with their names in Fig. 43; first the *architrave*, or principal beam, with a perfectly plain surface, except for the projection or *fillet* on the upper edge of it; next the *frieze*, which in the Doric style consists of a series of upright pieces which are the real supports of the cornice, and which are channelled with two grooves down the face, and a half-groove at each angle, these pieces being hence called *triglyphs* or "three-grooved pieces;" and between them a series of much thinner slabs which fill the spaces between them, called *metopes* (*i.e.* "between-spaces": μέτωπον, the space between the eyes, in its original meaning). The triglyph pieces go through the whole thickness of the wall, and are set with their narrower edge to the face; they are in fact short thick columns which carry the cornice blocks above, just as the genuine columns carry the architrave. The metope slabs support nothing, but are merely a filling in, having their broad surfaces outward and their edges fitting against the sides of the triglyph pieces. The metope slabs were generally, though not invariably, used as surfaces for sculpture or carved decoration, as indicated in the drawings. Above this portion comes the cornice, which marks and gives expression to the overhanging eaves of the

* See note, page 16.



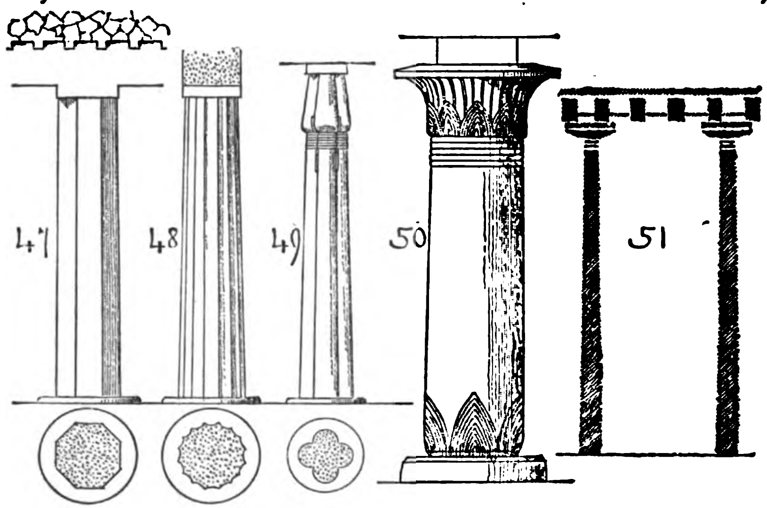
DORIC ORDER OF THE PARTHENON.

roof, and forms, so to speak, the eyebrows of the building. The underside of the projecting portion of the cornice is sloped, and is broken up by a series of flat slab-like forms (sketched in perspective in Fig. 45) called *mutules*, the surfaces of which are again broken up by a series of small circular flat-ended knobs, called the *guttæ*. All these main features are duplicated as we rise from the lower to the upper portion of the design. For each column there are two triglyphs, one centrally over the column and one over the interspace (except in regard to the angle columns, of which we will speak presently); for each triglyph, similarly, there are two mutules, one over the triglyph and one over the interspace. At the sides of the building the cornice is horizontal: at the ends (as shown in Figs. 43 and 44) the upper member assumes a raking line, following and expressing the sloping line of the roof.

This is the form in which the Doric style appears in its perfection in the Periclean era of Greece, about four centuries and a half B.C. Whence were these details originally derived?

It has been commonly held that a great portion, if not all of the Greek Doric details, were derived from an original prehistoric wooden form of construction, the reminiscences of which were laid hold of and worked into a masonic form by the later Greeks. In regard to the columns, however, this seems improbable. In the first place, stone columns which are obviously the rough unfinished idea of the Greek column are found in Egypt, belonging to a period long previous; such forms as are shown in Figs. 47 and 48. Secondly, the earlier Greek Doric columns, found at Pæstum and Corinth, and which have all the details of the finished Doric, only with less refined treatment, are thicker and more massive in proportion than the finished Doric; whereas if the original form had been a wooden one, the probability is that the earlier stone columns, closer in time to

the wooden original, would have been the thinner in proportion, and the thicker masonic proportions would have been gradually adopted later on. There have indeed been found on vases of an early period such representations of columns as those shown in Fig. 51, which have been taken to give a colour to the theory of a wooden origin; but it is much more probable that these were only a conventional decorative treatment of the column form,



EARLY FORMS OF COLUMN.

arbitrarily adopted by the vase-painter.* The architectural lesson to be learned from the Doric column as it stands, lies in its severely abstract treatment as a feature for supporting weight in an expressive manner. If we compare it with one or two of the typical Egyptian forms, shown in Figs. 49 and 50, we shall see that the latter exhibit a certain degree of imitative character; Fig. 49 preserves the idea of a bundle of stems and buds bound

* Among the "red-figured" Greek vases in the British Museum is one showing a rude and archaic-looking form of Ionic capital, and another with a rough representation of a Doric column, with no fluting, and of about the proportions, in height and thickness, of a modern street lamp-post. These vases are contemporary with the greatest period of Greek architecture, and show conclusively how little reliance is to be placed on vase-paintings as illustrations of architectural history.

together; 50, besides being clumsy in proportion, retains a very decisive flower form in its capital, and the turn-in of the column at the foot is also a feature quite at variance with abstract architectural feeling and with the expression of monumental solidity; it is a feature much more suited to a miniature object than to a column on a great scale, as this is. The Greek Doric column imitates nothing; it is a creation in itself. The lines formed by the flutings give it verticality of expression and what may be called sinew; there is a quasi-muscular expression about it, quite distinct from the cushiony flabby look of a big round column with no surface treatment, as frequently used by the Romans. The small cut just below the necking (C, Figs. 43 and 46) gives the first hint to the eye of stopping the upward lines of the flutings; the series of striations round the necking completes this stop; the *echinus* moulding (as it is called) below the abacus carries the eye out to the angle of the abacus; this moulding, in the best Greek work, is a very fine hyperbola curve, admirably adapted to give an expression of strength and support to the abacus, at the same time affording occasion for a very delicate play of light on the delicately modelled surface. The outline of the echinus and necking, larger scale, is given in Fig. 46. The only defect in the capital is the want of some filling up of the projecting angles of the abacus, which in an angle view (see Fig. 45) seems to stand out rather awkwardly from the top of the echinus. Otherwise, the Doric column and capital may be said to be the

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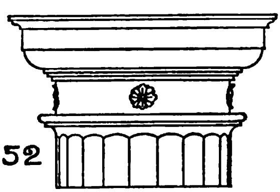

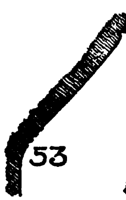

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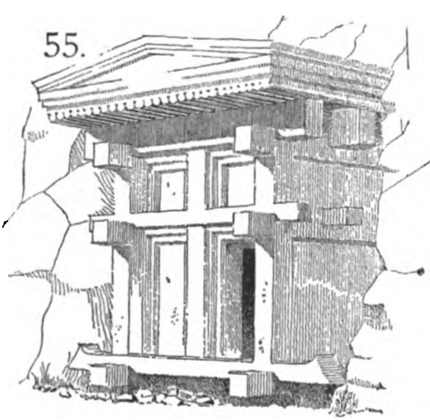
54

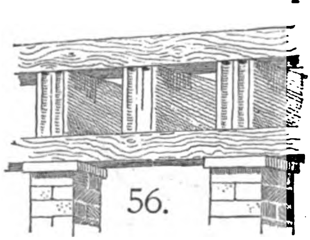
most perfect and intellectually finished architectural feature in existence, made as it was in fine marble which allowed of the

greatest perfection of line and finish; and to appreciate its delicacy of treatment we have only to turn to the typical "Roman Doric" capital (Fig. 52), with its commonplace half-round echinus and big projecting necking moulding; compare the Greek section of the echinus (Fig. 53), just referred to, with the corresponding Roman section (54), and the difference between artistic and inartistic work is prominently brought out.

In regard to the Greek entablature, however, the wooden origin seems little doubtful. We have not all the links in the transformation, but we have enough to give an idea of its progress. The form of rock-cut temple that has been found in Asia Minor, as shown in Fig. 55, is obviously a piece of carpentry imitated in stone, and if the upper portion of the side view of that be compared with the triglyph arrangement of the Doric frieze, it will be seen how almost inevitable is the conclusion that the triglyphs are the reminiscence of the ends of beams which formed a portion of the original timber construction.

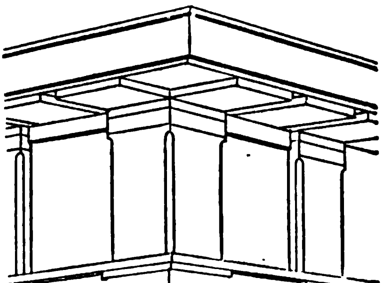


It even seems as if the triglyph ornament itself, the grooving, had rather a wood-chopping stamp left on it; that it might have been originally such a treatment of the ends of beams as is indicated in Fig. 56. The grooving, like the fluting of the columns, serves to emphasize the vertical function of this part



of the masonry ; but I confess the triglyph never seems to me to be a feature quite so intellectually worked out as other portions of the Doric Order. The feeling for balance of opposing lines, shown in the vertical and cross lines of the column, is again shown here, however, in the little bracket which is placed beneath the projecting capping of the architrave, below each triglyph—something for the vertical lines of the triglyph to repose upon, lest they should seem too heavy for the capping itself. The mutules have, like the triglyphs, the appearance of being a reminiscence of wooden construction ; Vitruvius speaks of them positively as representing the ends of the principal rafters, just as, he says, " in the Ionic Order the *dentils* imitate the projection of the common rafters." (The dentils are the smaller square-shaped projections, an example of which is seen in the Greek Corinthian cornice shown on page 68.) "Hence," he goes on to say, "the Greeks never placed dentils below the mutules, because the feet of common rafters cannot be below those of principal rafters ;" the "common rafters" being the upper smaller ones which are supported by the principal rafters. This shows how Vitruvius saw the wooden origin of the classic entablature, but this is no proof that the Greeks saw it in the same light : at all events the builders of the Doric temples of the great period had forgotten or ignored this "rafter" origin of the mutule, for, as will be seen on Fig. 43, the slope of the underside of the mutule is different from the slope of the roof line, which would necessarily be that of the rafters. Its origin was probably a wooden one originally, but the Periclean Greeks had apparently come to regard the mutule simply as a way of breaking up the horizontal line of the main projection of the cornice, and its shadow line also. The reason suggested by Mr. Garbett for making the underside of the cornice and mutules on a raking line is that the cornice being

viewed from below, its lines would have appeared much too flat and spread out too much, especially at the angles, if kept horizontal, as shown on Fig. 57, which represents the angle of the cornice as it would appear if the underside of it were horizontal, and should be compared with the angle view in Fig. 45: it would also lose some of its decisive shadow effect. It appears therefore, all things considered, that our Doric frieze and cornice are composed upon the main lines of an ancient wooden construction, but so far translated into stone forms that the origin has been nearly lost sight of by the designers; but for all that, these portions of the Order never attained quite the same perfection of intellectual expression as the column and capital, which were from the first, masonic forms; and it may be a question whether the Doric cornice and frieze could not be improved upon, although long association has made all the parts appear, to us, almost essential the one to the other.

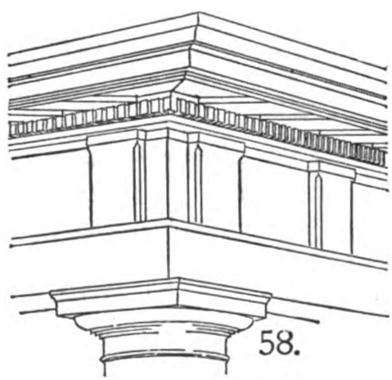


57.

In one respect, however, the Greeks retained a purely logical method in this portion of the work, viz., in the treatment of the triglyph at the angles of the building, already referred to in passing. Over all the columns except the angle ones the triglyph is placed centrally, or nearly so;* but to have placed it

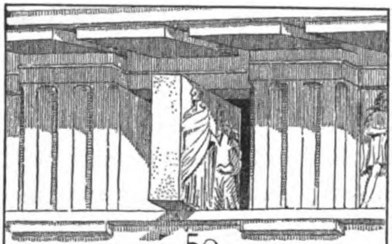
* In the Parthenon, according to Mr. Penrose's minute and careful measurements ("Principles of Athenian Architecture"), the third triglyph from the angle is not quite central over the second column, the adjustment of centres not being fully arrived at till the third column from the angle. The discrepancy is so small, however, that it might pass, and probably was intended to pass, unnoticed by a casual observer.

so over the angle columns would have necessitated taking the triglyph away from the angle. This would have involved either a false or an actually weak construction, as the triglyph is the solid supporting portion of the frieze, and at the angle this solidity is requisite especially. Accordingly at the angle the triglyph, as shown in Fig. 43, is not over the centre of the column; but in order to preserve the regularity of spacing here, and to keep the metopes, which are generally used for a series of square bas-reliefs, all of the same size and shape, instead of having an oblong space near the triglyph, the angle column and the one next it are placed closer than the others; or in other words, the "intercolumniation" (the space between the columns) is narrower next the angles. This narrower spacing of the columns at this point does not offend the eye, on the contrary it rather improves the architectural stability of the whole structure by giving it an appearance of greater solidity at the angles, whereas the interference with the regularity of spacing in the frieze and cornice would have been very unpleasantly apparent. The Romans quite overlooked this, and keeping the columns equally spaced, placed the last triglyph over the centre of the last column (Fig. 58), thus not only weakening the angle of the frieze, but taking away from the triglyph all its meaning as a supporting pier, and making it a mere surface ornament of no meaning; neglecting a real piece of architectural logic for the sake of an inferior and false logic. In the Greek building the triglyph was so entirely the constructive portion of the frieze



58.

that the metope slab might have been quite loose, or capable of being turned round and opened on a pivot, as is shown in



59.

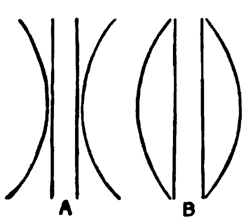
Fig. 59, without affecting the stability of the cornice above it in the least; and Mr. Tadema, whose paintings show such a complete insight into the spirit of Greek as well as of Roman architecture and design, has actually shown it so in one of his pictures, that entitled "A Love Missile."

In designing the details of their style, the Greeks, as is evident both from a study of the remains of their works and from what we learn from Vitruvius, proportioned every detail with a definite relation to the scale of the whole, the diameter of the column being apparently the principal *modulus* for determining the scale of the other details. Vitruvius gives a multiplicity of rules for thus proportioning the details, which, though they may not, and in some special cases obviously do not, represent accurately the Greek method of working, are nevertheless in all probability a correct representation of the general principle on which Greek buildings, as well as the Roman ones in imitation of them, were set out. The height of the column bore a certain relation to its diameter; the height of the whole entablature a similar kind of relation to the height of the column: in the Parthenon, the finest and most complete example of Doric architecture, the width of the abacus of the end columns is 1-15th of the width of the upper step on which the columns rest: and so on through every detail. This accurate proportioning on a fixed principle is one of the most remarkable characteristics of classic architecture. Thus the whole column and entablature in each style becomes a highly artificial

organised structure, in which every portion is designed with reference to the rest; and it is this mutual relation and correspondence of the parts which has led to the combined design of column and entablature being regarded and spoken of as an "Order," *i.e.*, as something designed according to a fixed and recognised order *(ordo)* or relation of parts. It is this severe logical relation between the several parts which renders Greek architecture (and in a much lesser degree Roman architecture) such an admirable study for the training of the eye in architectural design, even where there may be no intention of actually using or applying its forms in modern buildings.

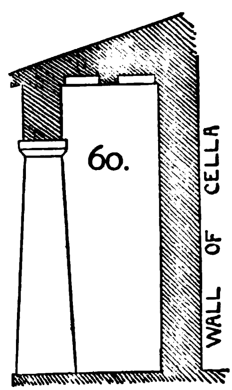
But the refinements of the Greek Doric style did not stop here. Certain passages in Vitruvius give a hint about a system of correcting the lines of the building for optical illusions, the true meaning of which, however, was not understood until Mr. Penrose undertook his remarkable investigation of the remains of the Parthenon, and discovered and laid down accurately the lines of curvature employed in what were theoretically the straight lines of the building. It had long been known that the bounding lines of the column are curved; the curve is hardly noticeable to the eye, unless very carefully looked for, being a departure of about half an inch from the straight line in a height of a little over thirty-one feet. Some of the older Doric examples, such as that at Corinth, have this curve, which is called the *entasis* of the column, much more developed, and apparently intended to produce a visible effect in the design; in the later Doric, however, it is refined down into a kind of concealed curve, if we may say so, not intended to catch the eye, but intended to compensate for a certain tendency which a straight-lined column has to appear slightly hollow in line. Why there should be this tendency to a hollow appearance in such an object it is not easy to say; it certainly does occur, and will be felt (rather than perceived)

by all accurate observers. What is still more remarkable is that this long flat curve, which has its apex about one-third up the shaft of the column, Mr. Penrose discovered to be a very flat hyperbola curve, the line falling in with this curve too precisely to leave, in his mind, any doubt of the intention. This fact, which is quite in keeping with what we know otherwise of the essentially mathematical turn of the Greek mind, may serve to give some idea of what a delicate and complicated affair architectural design was with the Greeks, and how different a kind of problem from that of architectural design as it is understood nowadays. Vitruvius refers also to the necessity of making the line of the basement or *podium* curved: "If it be set out level," he says, "it will have the appearance of being sunk in the centre;" and in accordance with this it is found that the lines of the steps in the Parthenon have an upward curve of about four inches in the end steps (the top one of which is 100 feet long) and about the same in the side ones. The end cornice is also curved upward to about the same extent; the reason of this is very obvious, for the contrast with the raking lines of the pediment cornice, rising from this straight line, would inevitably be to make the straight line appear to sink; all lines of opposing directions or curvature tend to exaggerate their opposing directions by contrast,* and the critical intellect of the Greeks,



* This may be proved very easily to the eye as follows:—Draw two perfectly straight and parallel lines in ink on white paper, say an inch apart and eight inches long, and draw two segments of circles one on either side of the parallel lines, so that each curve turns its convex to and nearly touches one of the straight lines, as at A; those two lines will then appear to converge slightly towards the top and bottom. Draw a similar diagram (B) reversing the segments of circles, so that the concave of each of them is towards the parallel lines, and the latter will then appear to be rather wider from each other towards each end, or hollow in the intermediate part. The figure is only given as an explanation; the effect can hardly be seen on so small a scale.

satisfied with nothing short of perfection, fought against this distorting effect of vision at every turn. The angle column, which was liable to be seen against the light at an angle view, instead of against a shadowed background, was made slightly thicker than the others, in order to allow for the fact, with which all painters are familiar, that an object dark against light is seen rather smaller than the same object light against dark; the light space always appearing to encroach somewhat on the dark one. This does not bring us to the end of the Greek refinements, for in addition to these curves for optical correction, the whole body of columns were set leaning slightly inwards, and the face line of the entablature also, by a very slight deviation from the perpendicular. On Fig. 43 the extent to which the column is sloped outward towards the base is shown by the vertical dotted line from the centre of the capital at B, which falls considerably within the centre of the base of the column. The slope backward of the architrave and frieze is just perceptible in the drawing. One possible reason for this slightly pyramidal arrangement of the building may be illustrated by Fig. 60, which represents the section of the colonnade. As the column diminishes upwards (the diminution being purposely exaggerated in the figure), it will be seen that the space between the colonnade and the wall would appear wider at the top (H) than at the bottom (K), which to a spectator standing within the colonnade, would make it appear as if the columns leaned away from the building. This bad effect may be actually seen in many modern colonnaded buildings in imitation of the Greek style. It seems probable, however, that there was the intention, in addition to this, to give the building externally a slightly pyramidal line to counteract

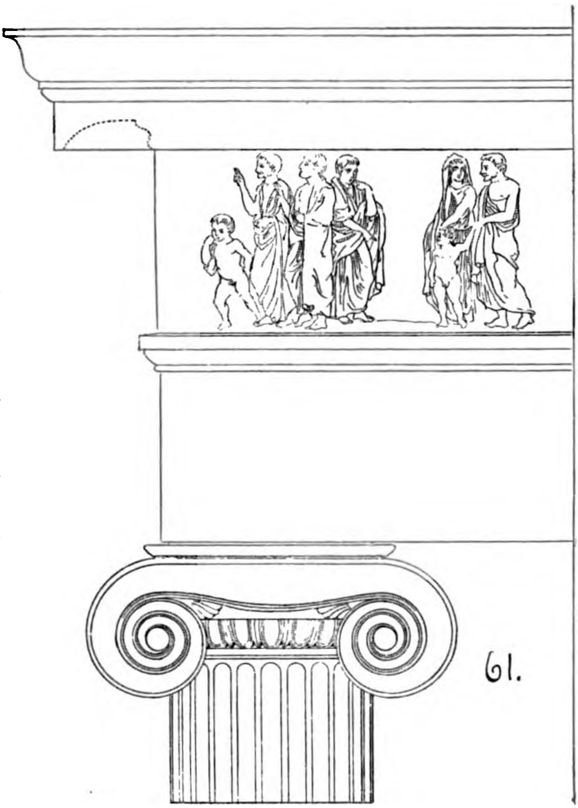


an optical illusion by which a building of perfectly vertical lines appears to lean outwards slightly; for the line of the entablature is also set slightly back in the same manner. It is worth note that Vitruvius advises the precisely opposite treatment of the entablature, viz., to let its lines slope slightly *outwards* towards the top, for the reason that as the entablature is seen foreshortened by a spectator looking up to it, some of its apparent height, and therefore of its correct apparent proportion with the height of the columns, would be lost by the spectator standing on the ground level. This is a strictly logical reason from the point of view here assumed by Vitruvius; but as it is clear that the practice of the Greeks, at all events in their greatest and most perfect building, was opposed to it, this is one of other reasons for supposing that Vitruvius, valuable as his hints are for the understanding of the Greek system of architecture, was not entirely master of their practice.

The modification of the lines of the building, as employed by the Greek architects, was not intended to sensibly affect the design, but only to correct optical illusion. The falling back of the line of entablature is visible on a large-scale drawing; but as the tendency of rectangular buildings with vertical sides is to appear to slope outwards slightly towards the top, in the actual building the slope merely corrects this impression; and the curvature of the columns is hardly discoverable except by measurement. Many draughtsmen will draw the Parthenon columns with a visible curve, because they know it is there, though they would find that a photograph double the scale (perhaps) of their drawing shows a perfectly straight line.

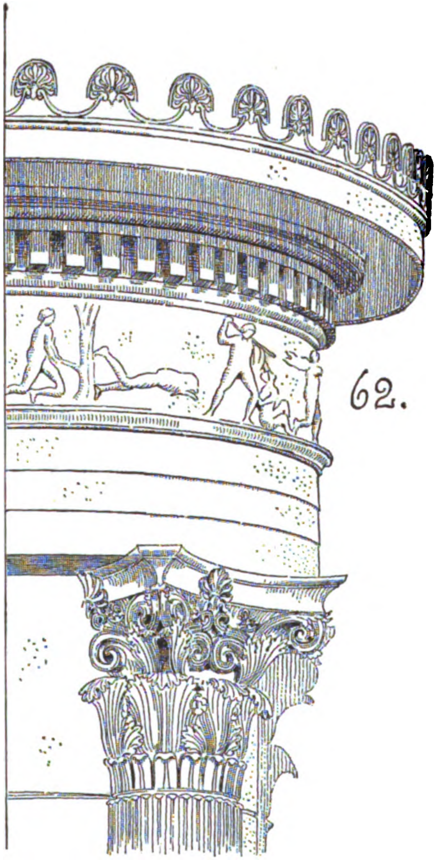
The main consideration has here been given to the Doric style, because of all the styles of classical architecture it is the most refined, complete, and logical. The two other styles of Greek architecture were the Ionic and the Corinthian. Each of these also consists, in its main features, of a column and

entablature on the same principle as the Doric, but with different proportions and details. There is not space here to go through these styles in the same detail as the Doric, but some facts in regard to them may serve to further illustrate our subject. It should be remarked here, and it is an important point as illustrating the manner in which architecture was practised by the Greeks, that these two styles are not progressive developments from the Doric, as with the various styles of Gothic architecture. In the latter, as we shall see when we come to consider them, the different styles succeeded each other almost insensibly by a process of natural development, arising in great measure from a struggle with constructional and geometric difficulties. But the three Greek styles, as may be seen especially in comparing the most prominent feature of each, the capital, have no such relation of development. The Doric capital (Figs. 43 and 46)



61.

contains not a suggestion from which to develop the Ionic (Fig. 61), which was used simultaneously with it in adjacent buildings; nor does the Ionic bear any family resemblance to the Corinthian (Fig. 62), which was slightly later in its use. The three appear to have been deliberately selected from different sources, and separately elaborated and refined. This fact is a very remarkable testimony (often overlooked) to the intellectual independence of perception of the Greeks; for there is no other instance known to us in the history of architecture prior to the Renaissance (when the whole process of architecture was altered), of such a deliberate and nearly simultaneous selection of architectural types at the mere will and taste of the selecters. In Gothic architecture, the "Early English" capital was an insensible and apparently almost inevitable development from the Romanesque capital, and the "Decorated" capital in like manner from the Early English; the process is so gradual and apparently unpremeditated that the line of demarcation between



62.

the one and the other style cannot be precisely selected. The Greeks alone seem to have had that clear critical power which raised them above the influence of mere circumstances, and enabled them deliberately to choose the good and reject the bad, and to fashion their architecture according to their reason and not in obedience to a blind process of development; and there can be no doubt that this is the highest intellectual standpoint of the architectural designer, although during the fervour of the Gothic revival in this century it was the fashion to think otherwise. The Ionic style, as its name indeed implies, probably had its origin in Asia Minor, where rock-cut proto-Ionic columns have been found, just as rock-cut proto-Doric columns are found in Egypt. The most noteworthy point in regard to the Ionic capital is that in these early forms which were its origin, it is usually, if not always, found on ranges of columns which are bounded at each end by projecting pilasters or masses of wall (Fig. 63), so that the capital was only really seen in front face (asdrawn in Fig. 61), and was not seen as an angle

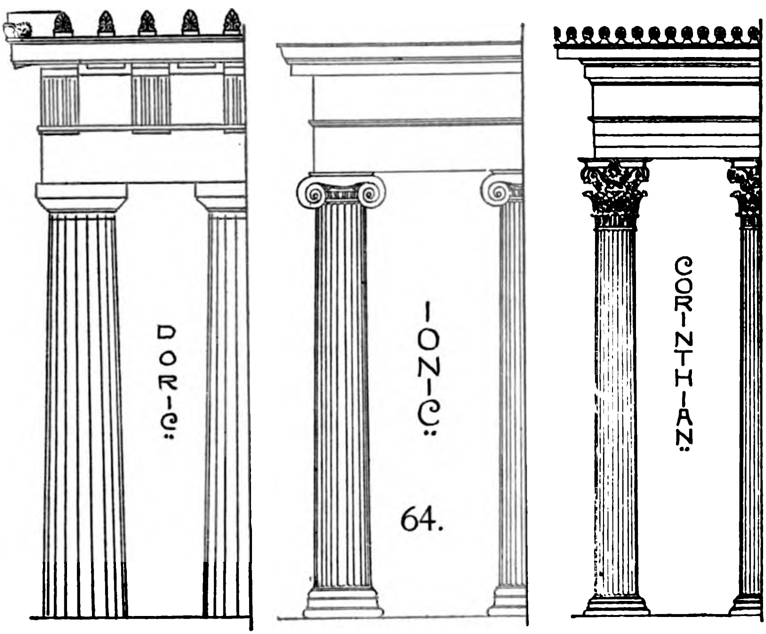
63

capital. A glance at it will indicate how completely it expresses and suits this position; it is a capital for a front view only, the side view of the capital showing only a big pillow-like roll. The Attic Greeks, with rather less than their usual critical perception, did, however, use this order, from time to time, in such a position that it became an angle column, and they then met the difficulty by giving the angle capital a double face, and setting the angle volute turned outwards from each face and at an angle of 45° with the main lines of the building, thus making the angle volute do double duty, for each face of the capital.

This was not a very happy expedient, and it may be taken as an example of the danger, even in the best hands, of removing a feature from the position it was originally designed for, and using it in one for which it is not suited.

In the Ionic or Corinthian styles the triglyphs had no existence, and the frieze became a continuous band, often used, especially in the Corinthian style, as the field either for a continuous decorative design, or for a series of figures in bas-relief telling some story of gods or heroes. In this point alone these styles seem to have taken a hint from the Doric, in which, as we have observed, the sculptured portion of the frieze, the metope slab, was the portion not doing any constructive work, and therefore fitted especially to be used as a space for decorative treatment. Where the triglyph blocks are no longer used, the whole wall of the frieze of course becomes a portion of the construction, there being nothing else to carry the cornice; but the Greek metope interspace having been formerly selected as an appropriate field for sculpture (long before the Periclean age), the frieze seems thence to have succeeded to that office (not quite so logically) even after it had ceased to be an alternation of supports and spaces, and had become a solid wall, to outward appearance at least; for in reality the blocks actually sculptured were usually comparatively thin facing blocks; still they form architecturally the main wall surface. But this surface decoration was applied only to the frieze; the Greeks never weakened the great constructive feature, the architrave, by carving it, unless by the addition of a narrow band of ornament in such a way as to emphasize its horizontal lines. We may observe in Fig. 62 (the entablature of the Choragic monument of Lysicrates at Athens) the first step towards modifying the treatment of the architrave, and notice what a strictly constructive treatment it is. Instead of the architrave

having one unbroken face, as in the Doric style or in the Ionic example given in Fig. 61, it is divided into three faces very slightly projecting one beyond the other, so as to break up the architrave into three horizontal faces, each projection giving, in a bright climate, a thin dark line of shadow under it. There can be no doubt that the main object of this was to give a somewhat lighter appearance to the architrave, to harmonise with the slighter proportions of the columns used in the Doric and Corinthian Order, while still retaining its constructive depth in one block. The usual proportions of the columns of the three



64.

orders are seen comparatively in Fig. 64; and it will be observed that the bare massive block of the Doric cornice would appear very heavy over the lighter column of the Corinthian

Order. But this treatment of the architrave, it will be seen, is still a severe and logical treatment; the horizontal lines emphasize its horizontality, just as the fluting lines emphasize the

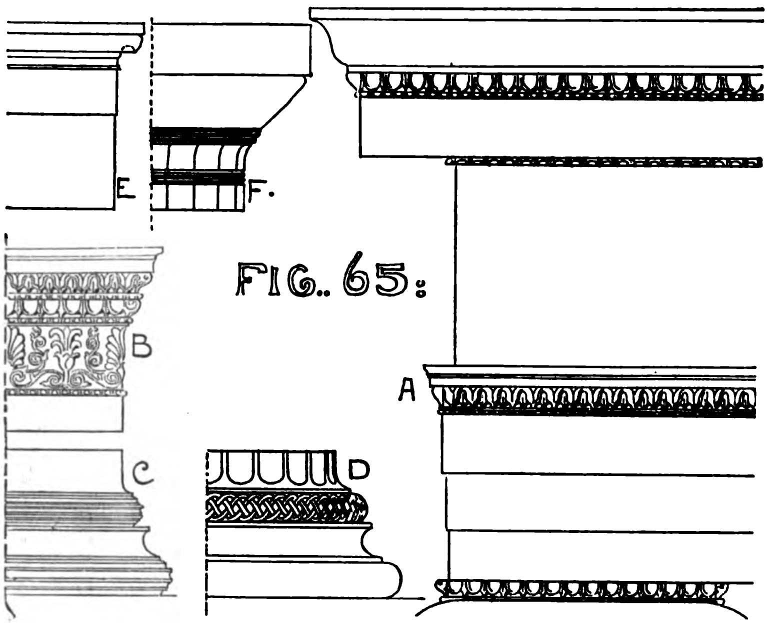
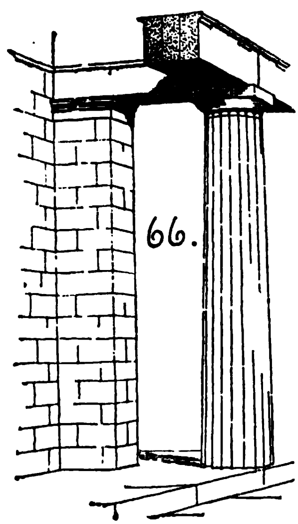


FIG. 65.

verticality of the column. In Fig. 65 an Ionic architrave is shown with a line of repeating ornament placed as a kind of miniature cornice (A) to the architrave, giving it a richer effect, but still in subordination to the true expression of the architrave, as a solid block supporting the rest of the entablature. Another point in Greek design which may here be illustrated is the distinctive treatment given to the pilaster against the wall which takes the end of a cross-lintel, the opposite end of which rests on a column. Such a projection or half column against the wall, and forming constructively part of it, is called in classic architecture an ***anta;*** the feature which plays the same part in Gothic architecture, as in

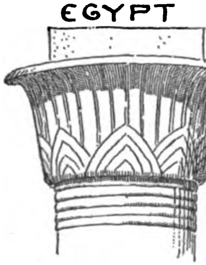
the wall-pier from which the first arch of an arcade springs, is called a *respond*. In Gothic architecture the respond is usually treated in just the same way as the complete pier; it is a half-pier against the wall; but this would not have satisfied the nicer critical sense of the Greeks. The *anta* was a portion of the wall projected to answer to the column which took the other end of the lintel; it was to have a capital to give it expression, but it was to be treated in a manner perfectly distinct from the column. B, Fig. 65, is a square anta capital from the Erechtheion, which ranges with an Ionic capital of the usual form: it will be seen at once how distinctive is the treatment. The base is also varied; C being the base of the anta, D the base of the corresponding column. In the case of the bases there is not such a difference in type; the object seems to have been partly to avoid monotony by a variation of the mouldings. In the Doric style the distinction between the column and the anta was even more decisively marked; at the two ends of the Parthenon the longitudinal walls of the *cella* project a little way past the cross walls at the end (see plan of Greek temple, page 34), each facing a column of the inner colonnade; and these projections are treated simply as pieces of wall with a moulded capping to them (Fig. 66), sufficient to emphasize them as being *en rapport* with the column, but in no way imitating it.


66.

Of the Corinthian style there are few extant Greek examples, the most noteworthy being the temple of Jupiter Olympius at Athens, of which a portion of the colonnade

remains, but which is a very late example of Greek work. The style received its chief development, as far as known examples go, at the hands of the Romans, whose taste for sumptuous carved decoration found more scope in this than in any other of the Greek styles which they adopted and modified after their own manner. The most beautiful monument in the Greek Corinthian style, however, and the most purely characteristic of Greek taste and refinement, is the little structure at Athens called the "Choragic monument of Lysicrates," dating about 335 B.C., a sketch of a portion of which has been given in Fig. 62. The upper portion of the capital is beyond all praise as a most beautiful piece of conventional ornament; in the lower portion there is perhaps rather a want of unity between the richly carved portion of the leafage and the plain leaves surrounding it at the base, and which seem hardly powerful enough, so to speak, for the rest. There can be little doubt that the original suggestion of the Corinthian capital was from the Egyptian capital, though Fergusson has given reasons for thinking that suggestions from Asia Minor were contributory to it also. If we compare it, however, with the Egyptian form shown in Fig. 67, we shall see that there is the same idea at the root of both; a base of successive leaves, with longer forms rising from behind them; and the flat foliage forms of the Egyptian, produced rather by incising than carving, are a natural method of treatment for granite, in which such more luxuriant forms as those of the Greek capital could not have been well executed. But if we take the Greek capital of the Temple of the Winds (Fig. 68), which is also a circular capital with comparatively flat leaves, only of a different type, its affinity

EGYPT



67.

GREECE

68.

with the Egyptian capital will be at once apparent; and the step from this to the Corinthian capital is not a very long one, except in regard to the scrolls or volutes at the angles; this was an essentially Greek feature, to support the angle of the abacus, and of its previous history we know little, but it has played a great part in architecture ever since its creation, as we shall see in a future chapter.

In speaking of Greek architecture, we are under the necessity of passing over the question of its roofing rather dubiously, for of the timber portions of the roofs which undoubtedly once existed there are no remains, and we are left pretty nearly to conjecture. But as far as the effect of the roofing on the architectural design is concerned, there can be no manner of doubt that the roofs were strictly on the beam principle, and that all the architectural development of the substructure is therefore perfectly in keeping with its office, as being designed to resist vertical pressure only, not outward thrust. Fergusson has left on record an ingenious and carefully worked out theory as to the manner of lighting and roofing a Greek temple, which excited a great deal of interest when first promulgated, and obtained a good deal of acceptance; but it is pure theory, without a particle of historical evidence, and can hardly be regarded as any longer tenable. We may fully accept, however, the negative certainty that, however the Greek temples were treated, they were *not*, as once universally taught, unroofed and open to the air. An architecture with no interior is no architecture at all.*

It will be observed that in Fig. 69, showing the "Five Orders," as recognised by the Romans, the entablature portion is shown with a boundary line on each side, a mere slice of entablature over the column and central with it, instead of

* Recent archæological opinion has tended towards the idea that the Greek temple was dependent for daylight only on the large end doorway, which is quite possible. This is at any rate the only source of daylight lighting for the interior which is absolutely *known*; anything further is but conjecture.

being shown as a continuous construction, as in the previous illustrations. This method of showing the entablature, which

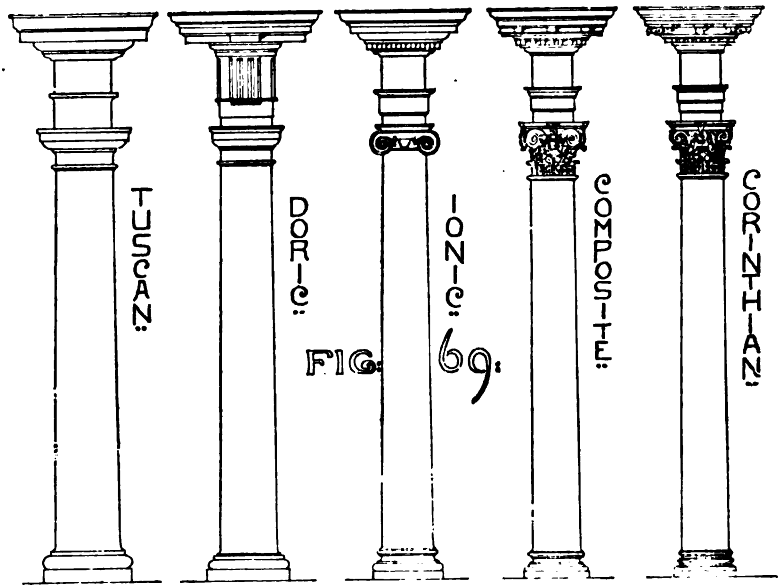
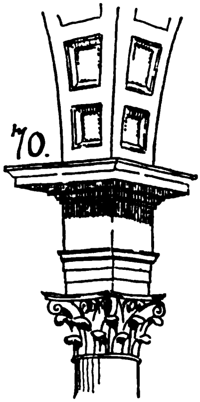


FIG: 69:

is usual in old engravings of the post-Renaissance period, is very characteristic of the manner in which the Order came to be regarded by the Romans, and by the Renaissance architects who worked on Roman lines. The Romans, copying the Greek Order, but beginning to employ the arch freely in their buildings, could not discern that the arch, which was one mode of covering over the space between the points of support, stood naturally and properly in the place of the architrave, as the portion supporting the superstructure To their ideas, regulated by those conventional rules which Vitruvius has summarised, it evidently seemed that a column was incomplete without an entablature; and accordingly, instead

of springing the arch from the column, they inserted a square slice of the proper entablature over the column, and sprung the arch or vault from that, as in Fig. 70. This treatment, which has been largely imitated in modern architecture since the Renaissance, is perhaps the most absurd and illogical blunder ever made in architecture; but blunders die hard when they have once become fashionable, and this one is still going on. Another Roman falsity in architecture was that, when they did use an arched form with only a capital or "impost" moulding,* they planted a columnar order in front of it, as in Fig. 71, with an architrave which makes believe to be carried by the column, but is really carried by the arch. The same thing is shown on an extended scale in the sketch of a portion of the Colosseum design given in Fig. 72. The Colosseum is in reality a completely arched construction, but as it was a show building it had to be made "architectural" by planting a series of "orders" on the outside of it. A remarkable and very instructive fact is that when the Romans built purely utilitarian works with the same arched construction,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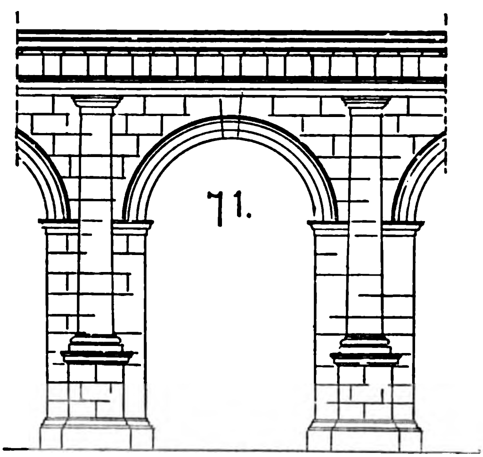
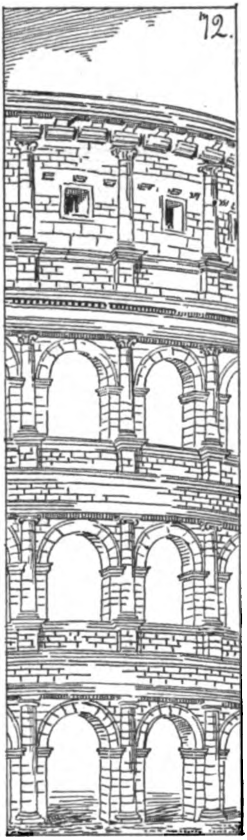

71.

* "Impost" is the point from which an arch springs.

in which it was not thought worth while to put ornamental pilasters and entablatures on, they really produced grand and impressive as well as perfectly truthful structures, as in their aqueducts, a sketch of a portion of one of which (that of Segovia) is shown in Fig. 73. Here, it will be seen, is a perfectly genuine and honest piece of building, pretending to be nothing but what it is, and really impressive, even in its present state, from its scale and massive construction, though in the minds of its builders it was a purely engineering work. We find an equally instructive parallel to this in the present day, where an engineering work such as London Bridge, which is simply grand and massive without pretence at architectural treatment, is a really impressive and (as the late Mr. Street called it) "a sublime bridge;" while Blackfriars Bridge, on which the engineers have clapped a quantity of vulgar and meaningless architectural (?) detail, is merely a ridiculous sham.



Returning to the classic order, which we have quitted for a moment, we see ranged in a row

in Fig. 69, the respectable family of "The Orders" as practised by the Roman architects and classified by Vitruvius. Whereas the Greeks had three styles or orders, the Romans made up five, the distinctive names of which are given beside them in the diagram. Precisely how or why these "Five Orders" came into being we cannot now determine; but they have, under their tutelary patron Vitruvius, exercised a great influence on subsequent architecture, and have been during no inconsiderable period of architectural history regarded as the Alpha and Omega of architectural design. But it would appear as if Vitruvius had really played somewhat the same part in regard to Greek architecture which Rickman, in a lesser way, played at the commencement of the English Gothic revival, in regard to Gothic architecture. Rickman classified Gothic architecture into Styles or Periods; Vitruvius classified Greek architecture, or what he supposed to be such, into Orders. The Tuscan Order, which was very plain and massive and entirely unornamented, was probably of Italian origin. The Doric of Vitruvius, as we have already suggested, was only a kind of travesty of the genuine Doric. The Ionic more resembled the Greek form, except in the liberties the Romans took with the capital. The Composite was a deliberate invention of the Romans, formed by combining the volute of the Ionic capital (in its angular position) with the foliage of the Corinthian. The result can hardly be called happy; it is only a Corinthian capital with an abnormally overgrown volute. The Roman Corinthian Order was the best achievement in this respect of the Roman architects; the capital is very finely designed, or it has retained more of pure Greek taste than any other of their capitals; the frieze and entablature, with their frequently highly-elaborated and sumptuous decoration, produce a *tout ensemble* which, though it is not of the most refined kind, has

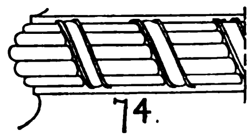
a power and richness of decorative effect which cannot be denied.

The mischief to architecture which has been worked by these Orders is partly due to untoward circumstances. At the revival of classical learning in the Renaissance period, the work of Vitruvius* was the one available literary guide, in the revived Latin literature, to the treatment of classic forms of architecture. His rules for the treatment of the Orders became a kind of architectural bible, the final authority from which there was no appeal. These rules thus became impressed on the modern architectural mind as of the first importance, and the result of this exaggerated worship of the Orders has no doubt been very prejudicial in some respects to modern architecture of the classical school, tending to render it a study of conventional scholastic rules instead of a free art. But in admitting this, it must be added that it is a great mistake to regard Vitruvius as a person to be spoken of slightingly or contemptuously. His book contains, besides his no doubt conventional rules for architectural designing (which were probably such as were generally accepted by the Romans in his day), evidence of very wide and complete practical knowledge; his idea of the dignity and of the *morale* of his profession is the very highest; he must have been an essentially noble-minded and upright man, from the internal evidence of his writings; and he succeeded in producing a treatise on a professional and technical subject which has lived for nearly two thousand years, has been translated into the language of every civilised country, and which even at the present moment no architectural library can afford to be without. It is not given to many men to accomplish that; and

* Vitruvius was a Roman architect who apparently, from his own account, had little actual practice, but was very well acquainted with his profession, and who completed his book probably somewhere about 25 B.C.

the modern architect or *dilettante* of the progressist school who sneers at Vitruvius is rather showing his own ignorance than discrediting the name of a man who, whatever his mistakes (which were partly at least those of his age rather than of himself individually), was an honour to his profession.

I have added here a few typical examples of Greek and Roman ornament (Figs. 74 to 77). The fuller consideration of this portion of the subject will be gone into in a succeeding chapter; but one or two of the examples here given may point a lesson in regard to the distinction between abstract and merely imitative ornament. Fig. 74, for instance, is an example of Roman ornament in which there is a pretence of binding together the several rolls of the moulding by a fillet wound spirally round them. No Greek artist would have done anything so commonplace and prosaic as that. In the Greek "egg-and-tongue" ornament, again (Fig. 75), it will be seen



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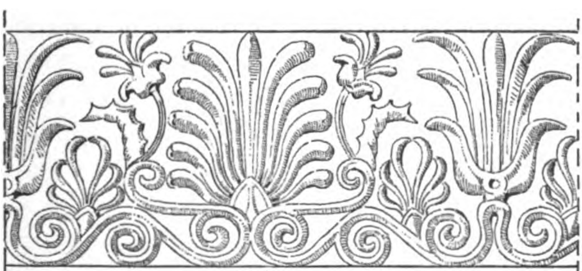


77.

that the forms are entirely abstract; they imitate nothing; they

are merely the effective alternation of a round and a pointed form. The Roman, in his version of it (Fig. 76), changes the pointed form into a direct imitation of an arrow-head, thus destroying its abstract character. The carved ornament from the Erechtheion (Fig. 77) is one of the most perfect specimens in existence of an ornament based upon nature and upon the principle of growth from a central point, but conventionalised into the most graceful architectural lines; a hint from nature, transmuted by the hand of the artist into architectural form.

In conclusion, the general lesson which we learn from the study of the Greek treatment of trabeated construction is that architecture in its intellectual form is not a matter of mere picturesquely sketched effects, but an art in which no study and refinement should be spared in order to produce the most logical expression of the construction of the building, and the most carefully designed and thought-out treatment of every portion, both in itself and in relation to the whole. It is impossible to come away from any prolonged study of Greek work without a feeling that all other architecture, however poetic and picturesque in general effect, is, by comparison, unfinished and unsatisfactory in its working out; a feeling which has been well expressed by Clough in some lines from his "Dipsychus," with which we may conclude this chapter, not as expressing the whole architectural truth, but as a very good expression of one side of it, that which we have been considering in this chapter:

"'Tis not, these centuries four, for nought
Our European world of thought
Hath made familiar to its home
The classic mind of Greece and Rome;
In all new work that would look forth
To more than antiquarian worth,

Palladio's pediments and bases,*
Or something such, will find their places ;
Maturer optics don't delight
In childish dim religious light,
In evanescent vague effects
That shirk, not face, one's intellects;
They love not fancies just betrayed,
And artful tricks of light and shade,
But pure form nakedly displayed,
And all things absolutely made."

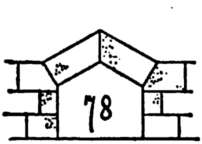
* It would have been more to the purpose if Clough had written "The Grecian pediments and bases." There was no need to drag in Palladio, whose art was only an inferior *réchauffé* of Greek art, as seen by him through the medium of Roman imitations.

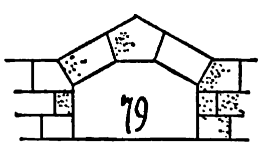
CHAPTER III.

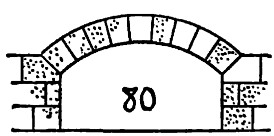
ARCUATED ARCHITECTURE.

In the last chapter we considered some of the principal forms of architectural design as dealing with and as influenced by the constructive principle of the beam. We are now to consider it as influenced by the constructive principle of the arch.

Put in the simplest language, the arch may be described as a method of supporting materials above a void, or making them support each other, by their mutual compression; by jamming them together, so to speak, so that they cannot fall into or through the space below them. We may begin with two stones tilted against each other so as to meet in the middle (Fig. 78), like our two rafters in Fig. 39 (page 46); and it is obvious that here they cannot fall so long as the walls remain immoveable. If we want to bridge over a wider space than the two stones will cross leaning against each other,







we may insert a third stone horizontally between the upper ends of the two leaning or rafter-like stones (Fig. 79), and these two

will support the third one between them as long as the walls against which they are abutted remain immoveable. Here we have made an important step towards the principle of the arch; and it is easy to imagine the principle carried further by little and little, until a large number of stones are supporting each other in the same manner (Fig. 80) over a void space narrower than the combined length of such stones if they were set out in a straight line, and which space therefore they cannot fall through so long as they are accurately fitted together and, and once more be it noted, so long as the walls which form their *abutment* remain unmoved.

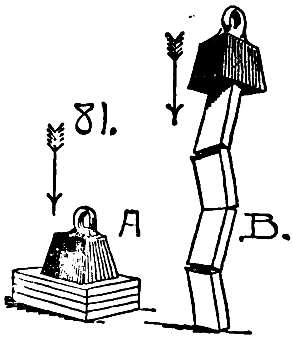
The conditions of stability are, however, much more complicated when we come to consider an arch of many stones, than in the primitive form of two leaning stones and a horizontal one supported between them, which has been suggested as a first and simplest form of the arch. In this primitive case the pressures are very simple and easily calculated; in the case of an arch of many stones the pressures are very complex, nor, in fact, is there any quite decisive or authoritative theory, up to the present day, as to the manner in which the pressures in an arch should be regarded. This want of certainty and unanimity as to theory is no doubt partly owing to the much greater difficulty of making and recording test experiments on the strength and the method of failure of arches, as compared with beams. The formulæ for the strength of beams, both wood and iron, in resistance to various strains, are now in a tolerably complete stage; the weights they will bear can be pretty certainly calculated, the manner in which they usually fail is known; but the theory in this case is the result of many series of experiments, which it is easy to make with beams. A beam breaks under test at some one point, and when broken the two portions are still there to be practically examined; or it deflects to a certain

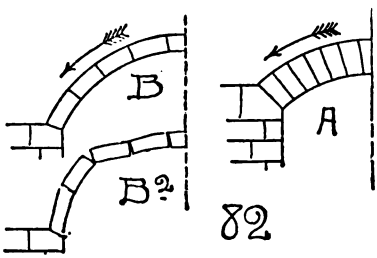
extent, and its deflection, and the amount of "set" which it takes,* can be accurately measured. But an arch must be experimented on under much less favourable conditions for observation. Being of rigid and not of elastic materials, it does not give way gradually, but by a sudden crushing at one or another point, the behaviour of which must be watched at the moment; and when the arch has parted and fallen under its test, it has gone altogether as an arch; it is in fragments which are of little use for further comparison or investigation as to its manner of falling. Rondelet's experiments are the most complete and important that have been made, and from them and other observations conclusions have been deduced which it is sufficient to state briefly and generally here, as we are mainly concerned here with the influence of the arch architecturally.

There is one difference in principle between our supposed primitive arch of three stones (Fig. 79) and the true arch, viz., that it is contrary to the principle of the true arch that the stones comprising it should be longer in the direction of the curve of the arch than in the direction of its thickness. The wedge-shaped stones (called *voussoirs*) composing a true arch act at certain points or under partial pressures like levers, one tending to thrust another round; and they have the more tendency to do this in proportion as they are long-shaped in the direction of the arch. And as the whole of the voussoirs composing an arch are in a state of compression one against another, it can easily be seen that pieces of material in compression, even apart from any arrangement in the arch form, are much more stable when subjected to compression on their sides than against their ends. Take three or four flat cubes of wood or tile; lay them one

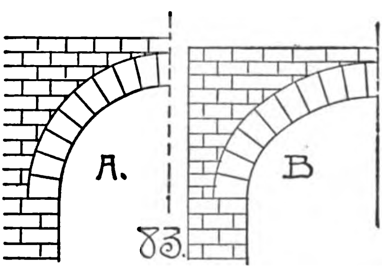
* "Set" is the term applied to a permanent deflection in a beam from which it does not recover.

over the other on their sides (A, Fig. 81), and they will sustain, without any disturbance of their position, any weight up to their crushing point; but place them on each other end to end vertically, with a weight on the top, as at B, and a very small irregularity in the pressure will overturn their equilibrium; one will turn on the end of another, and the whole will come down. In like manner the whole of the pieces composing an arch are in a state of resistance to compression, and the flatter they are (within certain limits) in the direction at right angles to the line of thrust, the less likely they are to turn one upon another as on a fulcrum. Thus, if the voussoirs composing the arch at A, Fig. 82, were arranged lengthwise as at B, the oblique pressure, when any weight came on the crown of the arch, would have some such result as shown at B 2; the voussoirs would turn on their edges.





The typical form of arch is that shown in Fig. 83 (A), the half-arch only being shown, whatever applies to the other half applying to the other, if we suppose it to be equally loaded. The voussoirs are wedge-shaped, with joints radiating from the centre from which the arch is struck,



because only so can all their bearing surfaces be brought into contact; and they are deeper in the joint than on the *intrados* and *extrados*,* for the reason just given in the last paragraph. Now, the arch as shown there is a series of wedge-shaped pieces held up across a void by being jammed together; they need not necessarily be arranged in the form of a semicircle; they might be arranged in an ellipse (as at B, Fig. 83) or in a catenary curve (the reverse of the curve formed by a suspended chain with its links free to move on one another), or in several other curves; but it is important that they should be arranged in a symmetrical curve of some kind, not only for appearance, but for securing an even balance of pressures; and the circle, or a segment of it, has been most used in the world's building work, as the easiest and simplest to construct. Now, inasmuch as the stones forming the upper portion of the arch, and whatever is built upon them, have a definite weight, with nothing immediately under to support it, it is clear that weight must go somewhere; it is, in fact, transformed into an oblique thrust acting against the lower portion of the arch, and tending to thrust out the arch and the wall which carries it. It will thus be seen what an important difference there is between the arch and the lintel in their effect on the substructure. The lintel, as we saw, exercises nothing but one simple vertical pressure on what is below it; the arch is constantly exercising an outward thrust upon the walls, tending to push them apart and to drop in between them itself; and this fact of the outward thrust of the arch was the main originating factor of what is known as the Gothic style of architecture, the greatest and most complete arched style of the world.

[In estimating the extent and direction of this outward

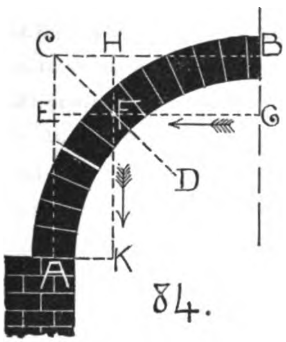
* The intrados is the line formed by the lower ends of the voussoirs; the extrados that formed by their upper ends.

thrust of the arch,* the old school of theorists used to consider the arch as built without mortar, and composed of voussoirs infinitely smooth on the surface and exercising no friction upon one another, so that the question was simply one of equilibrium of pressures. But this theory has been dropped in modern times, as being too far apart from the real facts of the case; for even if we leave the cementing materials out of account (as we perhaps ought), the friction of the voussoirs on one another is a very important factor in the stability of the arch; the cementing material is practically an important one also, so much so that it is related of Brunel that when an arch on one of his railways fell in, instead of reconsidering the stability of its lines, he merely gave orders to build it up again in cement, instead of ordinary mortar. In theory, however, cementing materials are only an additional safeguard against disturbance, not an element in the construction. But the friction of materials is a recognised power in engineering science, which has tabulated the slopes and angles at which different materials will retain their position by the action of friction as opposed to gravitation; and for stone as usually worked for building purposes the angle is about 30°. In Fig. 84 the upper joint of the fourth voussoir (distinguished by a thicker joint line) is at that angle, and the voussoir next above that joint (if those below are fixed) would be just in a state of equilibrium between the action of gravitation and that of friction, or the arch up to that joint would remain in the position in which it was placed, overhanging and just ready to fall, but retained by the friction of the voussoirs on one another. If another voussoir is added, it then would

* Some of my critics say that the following explanation of the statics of the arch is beyond the scope of the "general reader." I have found it quite intelligible to a general audience at a lecture; but readers who cannot follow the explanation may skip the paragraph between the brackets [ ] without losing any necessary link in the argument.—*Note to Second Edition.*

fall in, unless met by an opposing force tending to keep it in its place; and such a force is represented by the upper portion of the arch, which directs a pressure outwards from the centre to the side, counteracting the pressure inwards at the lower voussoirs. We may now, with at all events approximate truth, state the condition of the arch in this manner: both portions of the arch, that below and that above F in Fig. 84, exercise both a vertical and a horizontal force. The vertical force in each portion represents the weight of the materials and of whatever superstructure may be placed upon the arch; the horizontal forces represent in the lower portion, A F, a tendency to fall inwards, and in the upper portion, B F, a tendency to thrust outwards, and a diagram approximately representing these opposing forces may be constructed in this manner: taking the mean line of the lower portion, A, produce it vertically till it meets, at C, the mean line of the upper portion produced horizontally from B; then bisect the angle by the line C F D, and draw E F G horizontally through F, and K F H vertically through F. The parallelogram, H B F G, may then be taken to represent the combined vertical and horizontal pressures of the portion F B of the arch, H F representing the vertical pressure, and F G the horizontal pressure; and similarly the parallelogram, A E F K, may be taken as representing the vertical and horizontal pressures of the lower portion, A F, of the arch, E F being the horizontal pressure (inwards) and F K the vertical pressure. Thus it will be seen that the horizontal pressure is much the greatest in the upper half of a semicircular arch, a great part of the weight of this portion being transformed into an outward thrust, while in the lower portion the vertical pressure is the greatest, a great part of this lower portion of the arch pressing nearly vertically on the walls. Consequently it will be seen that in a semi-circular arch the greatest outward thrust is at a point about

halfway between the crown and the springing of the arch; and this theory is in accordance with observed fact. When an arch of this shape gives way through being overweighted, it does so by rising at or about the part F, the lower portion being thrust outward (at F), and the crown simultaneously sinking (at B). If we take a different form, a moderately pointed arch (Fig. 85), the point F is relatively higher, and the horizontal pressure, F G,



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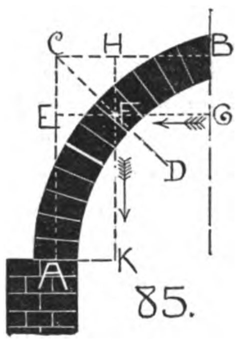

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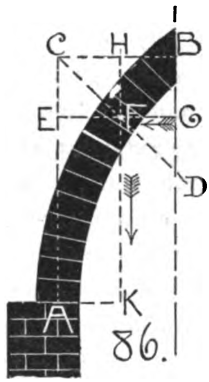
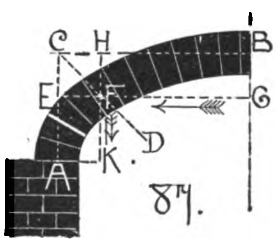


86.

is proportionately smaller; point the arch still more (Fig. 86) and we have E F and F G similar, and this arch has practically no thrust, the inward and outward pressures being balanced. Take an opposite form, a low elliptical arch (Fig. 87), and we find the horizontal thrust of the upper portion (F G) greatly increased, and the inward thrust of the lower portion (E F) diminished, and its vertical pressure (F K) diminished also, so that this is an arch requiring a great deal of abutment to resist its spreading tendency.]



87.

In a semicircular arch, as at Fig. 84, the line of pressure tends outwards towards the extrados of the arch as we descend towards the springing, owing to the accumulating weight and

pressure of the voussoirs above, and if the line of pressure gets outside the extrados, the arch is unstable and is nearly sure to give way outward at that point; so that the arch in Fig. 84, if we suppose it to be stable as drawn there, would become unstable if the voussoirs were materially reduced in depth: and an arch such as this, if standing free, would require to be thickened towards the springing, as in the dome section shown at Fig. 88 (page 94), which practically amounts to raising the line of wall and raising the real springing of the arch to a higher point. In practice, however, such an arch as Fig. 84 is almost always built in a solid wall, and is filled up solid above the extrados, as in Fig. 83; and in this case, if we suppose that arch with a solid wall over it as high as the crown of the extrados, the vertical weight of the wall above the haunches would be sufficient to counteract the outward thrust tending to make it rise at F: but there would still be some remnant of outward thrust left at the springing, and we must see that our vertical wall which supports the arch is strong and massive enough to resist this spreading tendency. If we suppose this arch to be prolonged along the whole length ot a building in the form of a tunnel, we should then be obliged to build a very thick wall along the whole length of the building to resist the thrust of the arch. A roof so built, a single prolonged arch, is what is called a "waggon vault;"* it is the simplest manner of vaulting a building, but it is a construction very wasteful of material, in consequence of the continuously thick walls which are required to carry it. How this is to be obviated, and the wall supports economised, we shall see just now when we come to speak of the vault.

But before going further, let us pause to point out why we have always spoken all along of stone as the material to be employed, and why the arch is so peculiarly a *masonic*

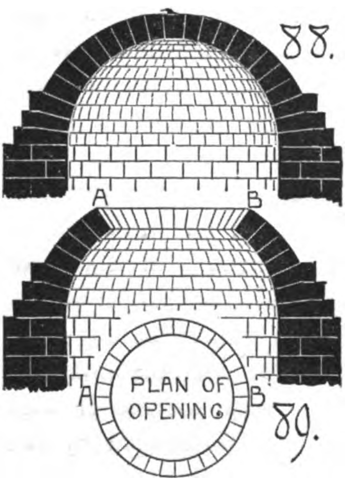
* See Fig. 95, page 102.

form of building. In speaking of the Greek lintel, it was observed that this employment of stone as a horizontal beam resting on two points of support is the weakest way in which stone can be employed. It is subjected to a strain tending to break it across, and stone being a granular material, with no fibrous cohesion in its parts, is more easily broken in this way than in any other, more easily even than by tension, since there is a greater leverage exercised to break it.* But such a material as stone is strongest in its resistance to compression; in other words, it requires much greater force to crush it than to rend it, and in the arch the voussoirs are all subject to compression, and to compression only; and hence the arch is in an especial sense the form of building suitable for stone. Wood has much less resistance to compression than stone (most woods at least) and is in other ways less desirable; iron could be employed in arch building, but it would be much more costly than stone, much heavier, and it can be used in a much more economical and suitable manner in the girder form. The arch is the form for stone building; and it has this great practical advantage also over the trabeated style, for stone, that it does not necessitate the use of large blocks. In a beam style a small space is bridged by one

* The difficulty into which construction may be brought in the endeavour to use a comparatively coarse-grained stone in this manner, is illustrated in the big Doric portico—not without a certain illogical grandeur of its own—which was put up as the entrance to the London and North Western Railway Station at Euston, at a period when it was supposed that everything was to be Greek. Here the scale of the Doric order employed was so large that monolith stones could not be easily obtained which would carry across the openings, and so the architraves are actually in two stones bonded together by iron cramps. It would be difficult to find a more pointed *reductio ad absurdum* of the fallacy of employing a style quite independently of, or in contradiction to, the mechanical capabilities of the material in which it has to be built.

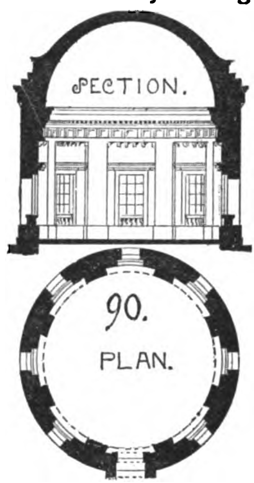
large block (if we are confined to stone); in an arch style a large space is bridged by many small blocks.

We have just referred to the waggon vault as a form in which the arch presses equally on the wall along its whole length; before turning to other forms of vaulting, let us glance at another form of arched roof which also presses on the whole of its substructure wall, but under very different conditions, viz., the dome. This form of covering (Fig. 88) is that which would be formed if we suppose the half-arch, Fig. 84, to be turned round horizontally in a complete circle, on B as its axis: it is an arch both ways, so to speak, its vertical section being a semicircle (usually) and its horizontal section a complete circle. This fact of its being composed of rings of horizontal arches or circles puts it under very different conditions from the arch: for when once a circle of the dome is completed horizontally, it cannot fall in. A dome may be built half-way up and then left,

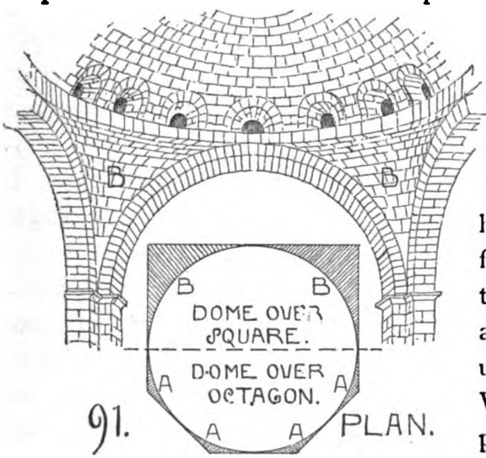


as in Fig. 89; and while an arch left in that unfinished stage would fall in, not having the upper portion to oppose it, the dome so left cannot fall in, because, as will be seen from the plan of the upper ring beneath Fig. 89, that upper ring is itself a horizontal arch, formed of stones which are wedge-shaped horizontally (as well as vertically). Hence a dome, though generally made of the section of a semicircular arch, for reasons of appearance, may be built in many forms of section in which an arch would not stand for a moment; it

may even be built with the lower portion in a reversed curve convex to the interior, which would in fact be a very strong section, as it would exactly follow the line of pressure, which tends outwards towards the base of the dome, as towards the base of the arch. It has generally been felt, however, that the architectural grandeur of the dome is best realised in its simplest form of a perfect hemisphere, or such a shape at least as would make a perfect



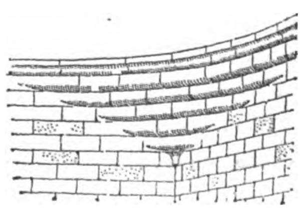
90.



91.

hemisphere to the eye; for there is much distortion of effect to be allowed for in looking up at a dome internally. When a circular dome is placed on a circular substructure, as in Fig. 90, the problem is an easy one; or when it is placed on an octagonal substructure, as indicated in the lower portion of the plan below Fig. 91, it will be seen that the octagon approaches so nearly to the circle as to leave only a little difference in plan to be adjusted by corbelling out* the walls till

* "Corbelling out" consists in building out, in the upper portion, beyond the line of the lower wall, by building each course of stones a little projecting beyond the one next below it.



they meet the circle. But where the dome has to be built over a square, as indicated on the upper side of the plan, Fig. 91, there remain two large angles to be filled up at B B (plan and sketch, Fig. 91). These portions, which are called "pendentives," have been the scene of many interesting experiments in architectural design. The constructive principle in treating them may be resolved into two methods; that in which the space B is really a segment of a dome abutting against the extrados of two of the main arches, as shown in Fig. 91; or that in which the pendentive is corbelled out, or carried on an oblique arch thrown across the angle above the springing of the main arches. The corbelling out principle cannot be very well employed on a square plan, except when the building is on a very small scale; when it is apparently employed, for the sake of picturesque effect, it will often be found that the actual construction is really domical: and there is no doubt that the domical treatment of the pendentive is the right one architecturally, because we are thus employing a homogeneous system of construction in every part of the building. In such a building as St. Sophia, where every portion is treated domically, we have the same system of architectural consistency as we find in the Greek style, where every space is covered by a lintel, and in the Gothic, where every one is covered by a pointed arch.

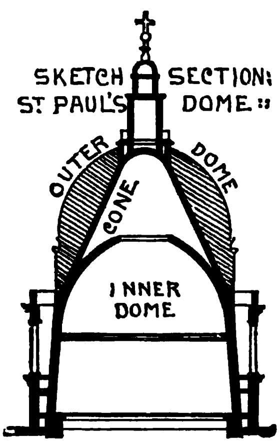
The dome is seen in its finest aspect, perhaps, rather as an internal than an external feature; notably so in St. Sophia, the great typical domed church, where externally the dome is hardly a prominent feature at all; and it is exceedingly difficult to treat a dome with equal effect internally and externally, as the treatment most effective in the one case is least effective in the other. Externally a dome is a feature

whose lines are all trending away from the eye: consequently, except from a great distance, it always seems lower than it really is in comparison with the rest of the building; every one knows how the dome of St. Peter's disappears as you approach the west front, sinking into the building:* and on the other hand, if the dome is raised sufficiently to make a lofty centre to the composition externally, the result is that internally it is too lofty for effect; it loses its apparent size through perspective diminution. Wren attempted to get over this difficulty in St. Paul's by making two domes, a timber and leaded one to show externally, and the real masonry dome to show internally; he has succeeded, there is no doubt, in producing a good effect both externally and internally, but it is at the expense of architectural and constructive truth.

Another anomaly in St. Paul's, the construction of the lantern which crowns the apparent dome externally, reminds us of another constructive point in which the dome differs from the arch. The arch, as already observed, is generally built up solid above the extrados, with a weight on the haunches (the portion of the arch midway between the springing and the crown); but the dome, when made an external as well as an internal feature, cannot have any load on the haunches. Consequently it is a very weak form to carry any weight on the crown, which would naturally (as shown in speaking of the arch) cause the haunches to rise; and hence the difficulty of planting any important

* This is partly, however, the fault of an architectural quack named Carlo Maderno, who had interest enough with some Pope or other to get the job given him of lengthening out the nave of the church, so as to destroy the composition of dome and substructure as Michael Angelo left it.

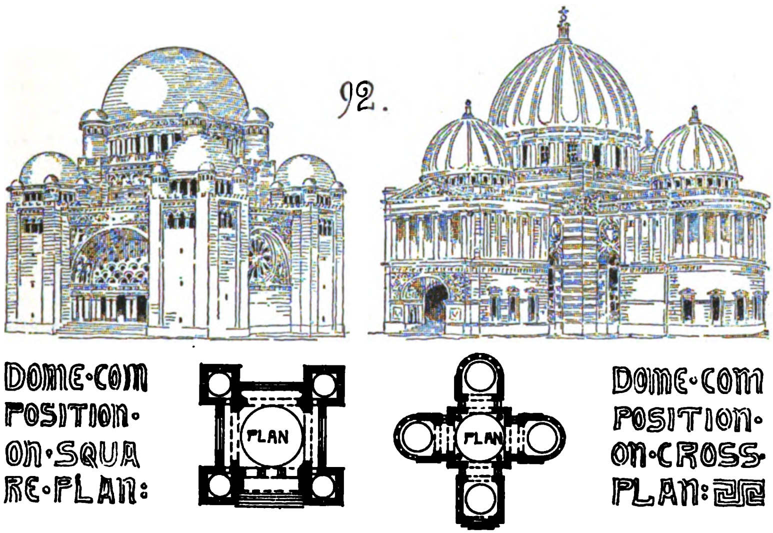
crowning feature on a dome. In the Florence cupola, Brunelleschi was so conscious of this that he made the cupola of a pointed section, the better to support the heavy lantern which he intended to mount upon it, and he also placed a tie round it at the haunches. It is true Brunelleschi's cupola, though often spoken of as a dome, is not a real dome; it is an octagonal cupola formed of eight arched gores meeting at the apex; but the treatment of its section to prepare for the carrying of the cupola would have been equally right had it been a true dome. In St. Peter's, the dome did begin to fail at the haunches in consequence chiefly of the weight of the lantern; and it had to be bandaged up with a chain (just where Brunelleschi had put his) to prevent further mischief. In St. Paul's Wren evaded the dilemma



again by a sham; the lantern is carried on a solid cone rising from the base of the masonry dome, inside the timber dome, to the apex of the latter, and on that the lantern really rests, not on the outer dome which appears to carry it, but which could not possibly do so. It is a very clever piece of construction, as solid as a rock; but somehow when we look at that leaded dome pretending to carry the lantern, which is really an independent structure protruded from beneath it, and which it could by no possibility carry, we feel our respect for what is in many senses a great building rather materially diminished.

The dome is a feature better fitted to be the architectural

expression of a plan with a wide central area than the culminating point of a long plan, and every one who compares the present plan of St. Paul's with the plan of Wren's first design—a Greek cross plan, with a small *pronaos* instead of a long nave—will feel, I think, that the latter is much more essentially a plan for domical treatment than the one executed. The dome lends itself very well, however, to the treatment of a plan consisting of several square areas adjoining, on the plan of a cross or some similar arrangement (but not on one straight line), as illustrated in Fig. 92. In this manner



92.

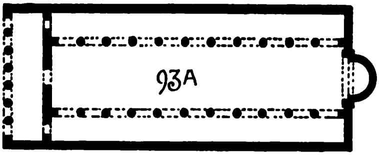
the dome has been largely and effectively used, and the combination of a central dome with smaller ones grouped round it usually produces a fine effect. On a great scale the dome appears to me to be, in spite of the difficulty of reconciling its internal and external treatment, the grandest

architectural feature invented by man, and to have capabilities of higher treatment and finer effect than have ever yet been realised with it, externally at least. The Renaissance architects have had too much their own way with it, and have ignored its possible poetry of effect, and treated it in a too conventional and scholastic manner; but if an architect of genius had a chance, he might do more with the dome now than was achieved either in St. Peter's or St. Paul's.*

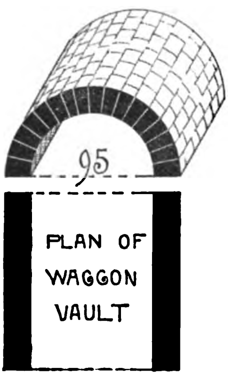
Returning now to our waggon vault, let us see how the

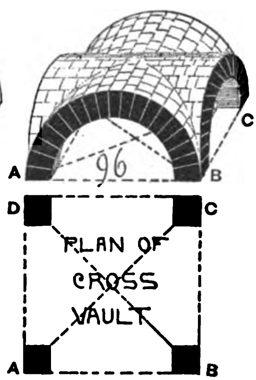
* A good deal has been said of late years in regard to the decorative treatment of the interior of the dome, in relation to the experiments in that direction made in the dome of St. Paul's. The subject is one of great interest, for there is no doubt that the interior surface of a large dome is one of the grandest and most suggestive positions that could be imagined for decorative treatment, but it appears to me that there are two mistakes which have operated to the prejudice of many of the dome decoration schemes that have been tried. One is the attempt to paint figure subjects on a dome, illustrating a special history. No one can ever see these properly, and they are thrown away in such a position: any figures that are introduced should be of a simple and purely decorative character, with no attempt at giving special expression or meaning to them. This can never be appreciated in a dome of first-class dimensions and height, unless the figures are on so large a scale that they must in that case have the very serious drawback of dwarfing the whole scale of the architecture. Dome decoration, again, should never be so strong in colour as to bring down the apparent height of the dome. It may have a most disastrous effect in this respect. One object of any decorative treatment should be to assist the soaring effect of a dome interior, not to lower it. The other point in which I think mistakes have often been made has been in dividing a dome for decoration into vertical sections, as Thornhill did in St. Paul's, and as was proposed to be done in the new scheme. This is contradicting the constructive character of a dome, which is a homogeneous hemispherical vault, not a collocation of vertical arches. The arrangement undoubtedly renders the task of the decorator much easier, by dividing up his work into more manageable sections; but it is destroying the essential grandeur of the domical form; any decoration which is applied to a dome should be on a scheme embracing the whole domical surface in one continuous design.

continuous vault, bearing on the walls for its whole length, became transformed into a vault exercising thrust only on certain portions of the wall, and how these portions were treated. The original form of the three-aisled mediæval church is found in the early Christian columnar basilica, as sketched in Fig. 93, plan 93A. This is, like the Greek temple, a purely trabeated construction, with its row of columns carrying the superstructure; only the columns have now ranged themselves inside the building, instead of outside. As the arch came into play in buildings of this class, the flat lintel roof became a waggon vault, but with the points over the piers marked by transverse arches of greater thickness, as shown in the sketch of a bit from the Romanesque church at Valence, Fig. 94. Here also we see that a first step is made towards what was to become one of the great characteristics of Gothic architecture, the dividing out of the supporting piers into separate members each carrying its own portion of the design of the superstructure, architecturally speaking. Con-



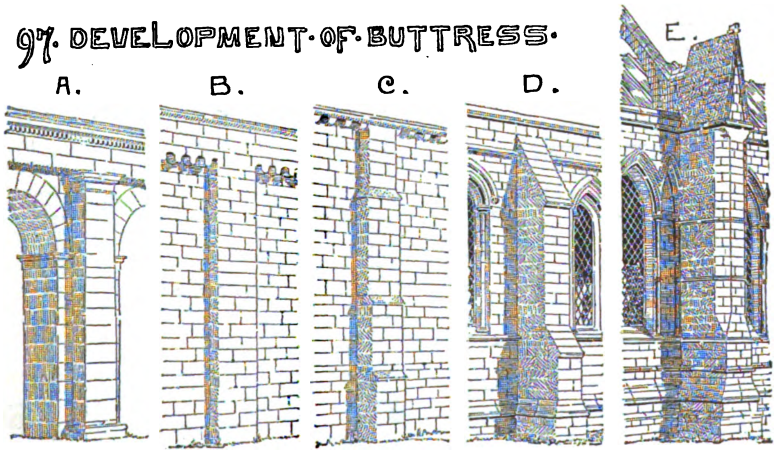
structively, the pier remains as one mass, but it is broken up, for the sake of architectural expression, into separate members; in place of the single column of the classic form, which does duty, on its own lines, in Fig. 93, the pier appears now in the guise of two much longer-proportioned columns, one of which carries the arch of the nave arcade, the other carries the transverse arch or rib which strengthens the roof at these points. But the roof, constructively, is still a continuous waggon vault, not differing essentially from the simple form of the waggon vault as shown in Fig. 95. The great step was taken when it was discovered that two such vaults could be built interpenetrating, as shown in Fig. 96. The Romans used this form of vaulting, but (as will be shown presently) did not hit upon the right architectural expression for it. The state of things which this brings us to is, that all the thrust of the roof is taken off the walls except at the four points whence the cross arches and the oblique arches spring; A, B, C, D. If we can make those points secure, we can play with the interspaces as we choose. And how are we to support those points? Not by a feature like the column, for that is only a feature for resisting vertical pressure, and here we have a collection of pressures from different directions, but all (as they are from arches) thrusting outward. What we want is an opposing thrust inwards to meet them, and that is supplied by the *buttress*, the well-known form which is to Gothic architecture what





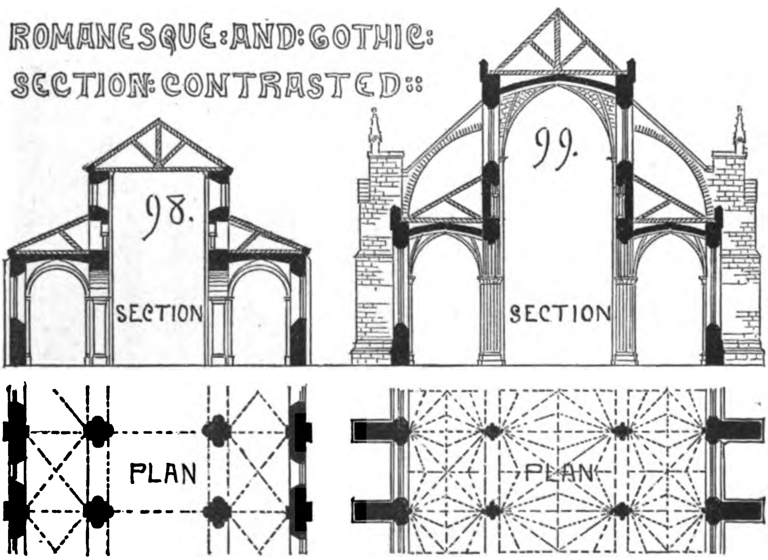
the column is to Greek architecture; a form which, instead of standing vertically under the point of pressure, slopes outwards from it, and thus strengthens the construction in the direction in which strength is wanted, and at the same time gives the correct and logical architectural expression. But it was only by very slow steps that this transformation of the column into the buttress was completed. The Romans, in their arched constructions, habitually strengthened the piers by adding columnar features to the walls, as shown at A, Fig. 97; thus again making a false use of the column in a way which was never contemplated by those who originally developed this feature. In Romanesque architecture the column was no longer used for this purpose; its place was taken by a flat pilaster-like pro-

97. DEVELOPMENT OF BUTTRESS.



jection of the wall (B, Fig. 97), which gave sufficient strength for the not very ambitious vaulted roof of this period, where often in fact only the aisles were vaulted, and the centre compartment covered with a wooden roof. At first this pilaster-like form bore a reminiscence of a classic capital as its termination; a moulded capping under the eaves of the building. Next

this capping was almost insensibly dropped, and the buttress became a mere flat strip of wall. Then it was slightly thickened, as it descended, by set-offs, as at C; and as the vaulting became bolder and more ambitious, the buttress had to be made more massive and of greater projection to afford sufficient abutment to the vault, more especially towards the lower part, where the thrust of the roof is carried to the ground. Hence arose the tendency to increase the projection of the buttress gradually downwards, and this was done by enlarging and extending the successive slopes or "set-offs," as at D, which assisted (whether intentionally or not in the first instance) in further aiding the correct architectural expression of the buttress. Then the



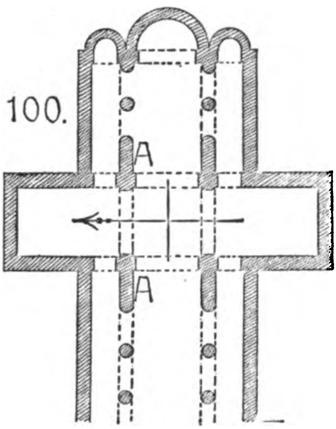
vaulting of the centre aisle was carried so high and treated in so bold a manner, with a progressive diminution of the wall piers (as the taste for large traceried windows developed more

and more), that a flying buttress was necessary to take the thrust across to the exterior buttress, and these again, under this additional stress, were further increased in projection (E, Fig. 97), and were at the same time made narrower (to allow for all the window-space that was wanted between them), until the result was that the masses of wall which in the Romanesque building were placed longitudinally and parallel to the axis of the building (Fig. 98), have all turned about and placed themselves with their edges to the building to resist the thrust of the roofing, as in Fig. 99. The same amount of wall is there as in the Romanesque building, but it is arranged in quite a new manner, in order to meet the new constructive conditions of the complete Gothic building.

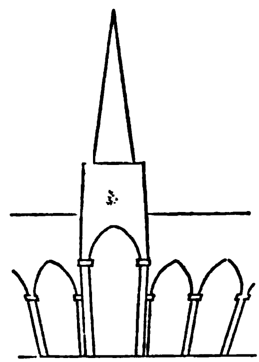
It will be seen thus how completely this important and characteristic feature of Gothic architecture, the buttress, is the outcome of practical conditions of construction. It is treated decoratively, but it is itself a necessary engineering expedient in the construction. The application of the same principle, and its effect upon architectural expression, may be seen in some other examples besides that of the buttress in its usual shape and position. The whole arrangement and disposition of an arched building is affected by the necessity of providing counterforts to resist the thrust of arches. The position of the central tower, for instance, in so many cathedrals and churches, at the intersection of the nave and transepts, is not only the result of a feeling for architectural effect and the centralising of the composition. It is the position in which alone the tower has the cross walls of nave and transept abutting against it in all four directions: if the tower is to be placed over the central roof at all, it could only be over this point of the plan. In some of the Norman churches, which in some respects were finer constructions than those of later Gothic, the desire to provide a

firm abutment for the arches carrying the tower had a most marked effect on the architectural expression of the interior. Thus we find instances (as at Tewkesbury) where the tower piers are designed in the usual way towards the north and south sides (viz., as portions of a pier of nearly square proportion standing under the angle of the tower), while in the east and west direction they run out into great solid masses of wall (A, Fig. 100), in order to ensure a sufficient abutment for the tower arches. On the north and south sides the solid transept walls were available immediately on the other side of the low arch of the side aisle, but on the east and west sides there were only the nave and choir arcades to take the thrust of the north and south tower arches, and so the Normans interposed a massive piece of wall between, in order that the thrust of the tower arches might be neutralised before it could operate against the less solid arcaded portions of the walls. This expedient, this great mass of wall introduced solely for constructive reasons, adds greatly to the grandeur of the interior architectural effect. The true constructive and architectural perception of the Normans in this treatment of the tower piers is illustrated by the curious contrast presented at Salisbury. There the tower piers are rather small, the style is later, and the massive building of the Normans had given way to a more graceful but less monumental manner of building. Still the abutment of the tower arches was probably sufficient for the weight of the tower as at first built; but when the lofty spire was put on the top of this, its vertical weight,

100.



pressing upon the tower arches and increasing their horizontal thrust, actually thrust the nave and choir arcades out of the perpendicular towards the west and east respectively (as indicated in the exaggerated sketch in the margin), and there they are leaning at a very perceptible angle away from the centre of the church — the architectural expression, in a very significant form, of the neglect of balance of mass in construction.



But while the buttress in Gothic architecture has been in process of development, what has the vault been doing? We left it (Fig. 96, page 102) in the condition of a round waggon vault, intersected by another similar vault at right angles. By that method of treatment we got rid of the continuous thrust on the walls. But there were many difficulties to be faced in the construction of vaulting after this first step had been taken, difficulties which arose chiefly from the rigid and unmanageable proportions of the circular arch, and which could not be even partially solved till the introduction of the pointed arch. The pointed arch is the other most marked and characteristic feature of Gothic architecture, and, like the buttress, it will be seen that it arose entirely out of constructive difficulties. These difficulties were of two kinds; the first arose from the tendency of the round arch, when on a large scale and heavily weighted, to sink at the crown if there is even any very slight settlement of the abutments. If we turn again to diagram 84 (page 91), and observe the nearly vertical line formed there by the joints of the keystone, and if we suppose the scale of that arch very much increased without increasing the width of each voussoir,

and suppose it built in two or three rings one over the other (which is really the constructive method of a Gothic arch), we shall see that these joints in the uppermost portion of the arch must in that case become still more nearly vertical; in other words, the voussoirs almost lose the wedge shape which is necessary to keep them in their places, and a very slight movement or settlement of the abutments is sufficient to make the arch stones lose some of their grip on each other and sink more or less, leaving the arch flat at the crown. There can be no doubt that it was the observance of this partial failure of the round arch (partly owing probably to their own careless way of preparing the foundations for their piers—for the mediæval builders were very bad engineers in that respect) which induced the builders of the early transitional abbeys, such as Furness and Fountains and Kirkstall, to build the large arches of the nave pointed, though they still retained the circular-headed form for the smaller arches in the same buildings, which were not so constructively important. This is one of the constructive reasons which led to the adoption of the pointed arch in mediæval architecture, and one which is easily stated and easily understood. The other influence is one arising out of the lengthened conflict with the practical difficulties of vaulting, and is a rather more complicated matter, which we must now endeavour to follow out.

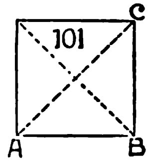
Looking again at Fig. 96, it will be seen that in addition to the perspective sketch of the intersecting arches there is drawn under it a plan, which represents the four points of the abutment of the arches (identified in plan and perspective sketch as A, B, C, D), and the lines which are taken by the various arches are shown by dotted lines. Looking at the perspective sketch, it will be apparent that the intersection of the two cross vaults produces two intersecting arches, the upper line

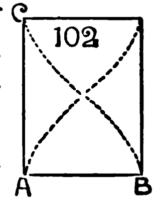
of which is shown in the perspective sketch; this intersection of the two arches, which forms a *furrow* in the upper side of the construction, forms an *edge* underneath which traverses the space occupied by the plan of the vaulting as two oblique arches, running from A to C and from B to D on the plan. Although these are only lines formed by the intersection of the two cross arches, still they make decided arches to the eye, and form prominent lines in the system of vaulting; and in a later period of vaulting they were treated as prominent lines and strongly emphasized by mouldings; but in the Roman and early Romanesque vaults they were simply left as *edges*, the eye being directed rather to the vaulting surfaces than to the edges. The importance of this distinction between the vaulting surfaces and their meeting edges or *groins** will be seen just now. The edges, nevertheless, as was observed, do form arches, and we have therefore a system of cross arches (A B and C D), two wall arches (A D and B C), and two oblique arches (A C and B D), which divide the space into four equal triangular portions; this kind of vaulting being hence called *quadripartite* vaulting.

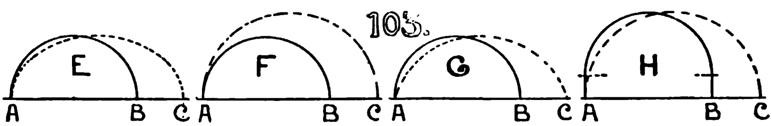
We have here a system in which four semicircular arches of the width of A B (Fig. 101) are combined with two oblique arches of the width of A C, springing from the same level and supposed to rise to the same height. But if we draw out the lines of these two arches in a comparative elevation so as to compare their curves together (E, Fig. 103), we at once find we are in a difficulty. The intersection of the two circular arches produces an ellipse with a very flat crown (shown by the dotted

* A *groin* is the edge-line formed by the meeting and intersection of any two arched surfaces. When this edge-line is covered and emphasized by a band of moulded stones forming an arch, as it were, on this edge, this is called a *groin-rib*.

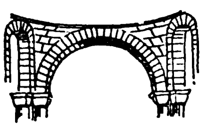
line A C in diagram E), and very liable to drop at the crown. If we make the oblique arches complete circles (dotted line in F, Fig. 103), we see that the oblique arch A C must rise higher than the side and cross arches A B, with the result that each compartment of the vault would rise up in a kind of dome, as shown in Fig. 104 below. But if, instead of having a square space, we have an oblong one to vault over, as in Fig. 102, we have a further complication. If the arches on the sides A B and A C (Fig. 102) are both semicircular, A C must rise higher than A B, and the intersecting vault

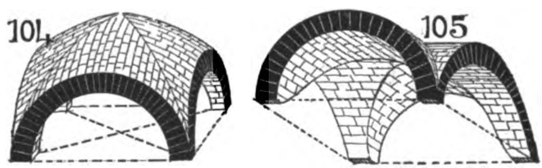






would be impracticable. We can keep them to the same level at the crown either by making the wider arch only a segment of a circle (G, Fig. 103), or by doing what is called "stilting" the narrower arch (H, Fig. 103), that is, making the lower portion straight, and the real arch spring from a point above the impost, a device of constant use in Byzantine and early Romanesque architecture for making wide and narrow arches come level at the crown (see sketch); and a very clumsy

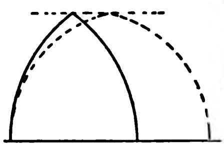




and unsightly device it is. But the effect of either expedient,

in cross-vaulting, would be to make the oblique arches of intersection twisted, as shown on plan in Fig. 102, and sketched in Fig. 105, the two differently curved vaulting surfaces not intersecting evenly. All these difficulties were unavoidable as long as nothing but the round arch was available for covering spaces of different widths. The whole of these difficulties were approximately got over in theory, and almost entirely in practice, by the use of the pointed arch. In the first place, the pointed arch gets over the difficulty and danger of the flat crown in the intersecting or oblique arches; in the second place, it enables spaces of different widths to be arched over by arches which (as shown in Fig. 106) are very nearly coincident in their curves near the springing, and can therefore be adjusted much more easily to make a regular-looking and

106.



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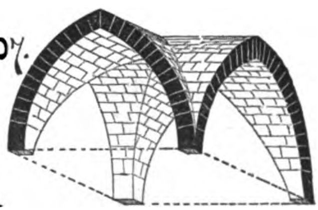
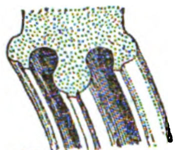


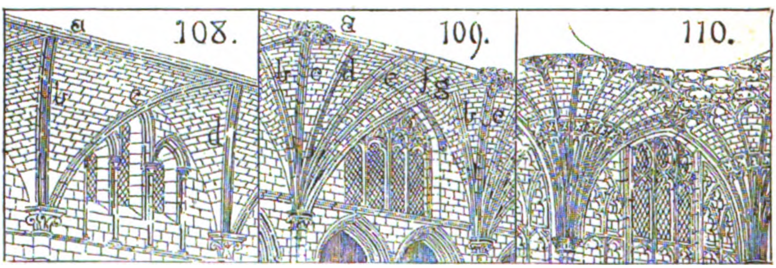
safe intersecting vault, the appearance of which in its simplest form is sketched in Fig. 107.

But now another and most important change was to come over the vault. The mediæval architects were not satisfied with the mere edge left by the Romans in their vaults, and even before the full Gothic period the Roman builders had emphasized their oblique arches in many cases by ponderous courses of moulded or unmoulded stone in the form of vaulting ribs. These, in the case of Norman building, were probably not merely put for the purpose of architectural expression, but also because they afforded an opportunity of concealing, behind the

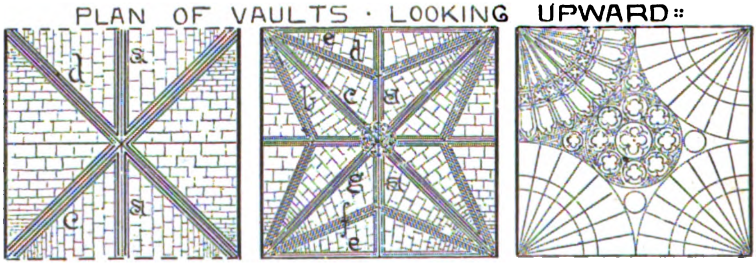
lines of a regularly curved groin-rib, the irregular curves which were really formed by the junction of the vaulting surfaces. But when the vault became more manageable in its curves, after the adoption of the pointed arch, the groin-rib became adopted in the early pointed vaulting as a means of giving expression and carrying up the lines of the architectural design. On its edge were stones moulded with the deep, undercut hollows of Early English moulding, defining the curves of the oblique as well as of the cross arches with strongly-marked lines, and thus placing them all on a level with each other in architectural importance; the oblique vault of the arch is no longer a secondary line in the



GROIN-RIB MOULDING



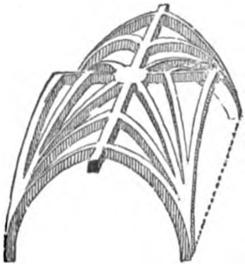
PLAN OF VAULTS · LOOKING UPWARD::



vaulting design; on the contrary, it is the principal structural line of the vaulting, and the cross arches might be (and some-

times were) omitted, as in Fig. 108; so that what in the early Romanesque waggon vault (Fig. 94) was the main structural feature has become superfluous, and the line of the oblique arch (c, b, d, 108) has taken its place.

The effect of the strongly marked lines of the groin-ribs, radiating from the cap of the shaft which was their architectural support, seems to have been so far attractive to the mediæval builders that they soon endeavoured to improve upon it and carry it further by multiplying the groin-ribs. One of the stages of this progress is shown in Fig. 109. Here it will be seen that not only is the cross-rib shown, but that intermediate ribs have been introduced between it and the oblique rib.* The richness of effect of the vault is much heightened thereby; but a very important modification in the mode of constructing it has been introduced. As the groin-ribs became multiplied it came to be seen that it was easier to construct them *first*, and fill in the spaces afterwards; accordingly the groin, instead of being, as it was in the early days of vaulting, merely the line formed by the meeting of two arch surfaces, became a kind of stone scaffolding or framework, which might be built and stand alone, as in the accompanying sketch, and between which the vaulting surfaces were filled in with lighter material. This arrangement of course made an immense difference in the who'e principle of constructing the vault, rendering it much more ductile in the

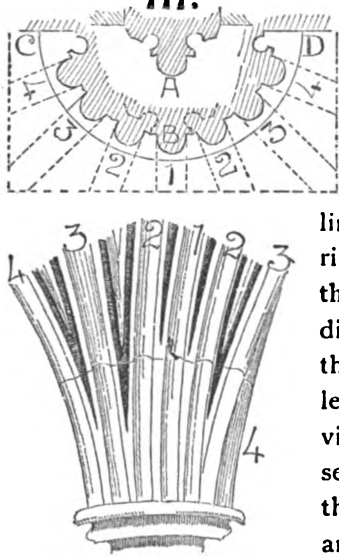


hands of the builder—more capable of taking any form which he wished to impose on it, than when the vault was regarded and built as a mere intersection of surfaces. There was still

* The plans, in Figs. 108 to 110, show the whole square of the vaulting compartment; the perspective sketches show one side only, as seen from the other side.

one difficulty, however, one slight failure both practical and theoretical in the vault architecture, which for a long time much exercised the minds of the builders. The ribs of the vaulting being all of unequal length, they still had to assume slightly different curves almost immediately on rising from the impost, and as the mouldings of the ribs have to be run into each other ("mitred" is the technical term) on, or just above, the impost, there not being room to receive them all separately, it was almost impossible to get them to make their divergence

111.

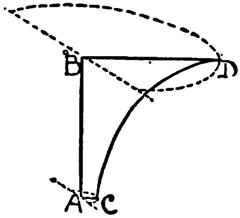


from each other in a completely symmetrical manner. If we suppose A in Fig. 111 to be the section of the rib-moulding, we can see that if several of those ribs are to be brought down on to a small semicircular cap (the line of which is shown by C, D), the rib mouldings will be run together so that part of the mouldings will have disappeared altogether by the time they are brought down on to the cap, leaving only the central roll moulding visible, as at B; and it will easily be seen on the plan (Fig. 111) that if these ribs have to diverge at equal angles to points on the boundary lines of a rectangle, they will have different lengths; No. 3, which goes to the angle of the vaulting-space, will be the longest; Nos. 2 and 4 will be longer than No. 1; their curves must therefore be different, and the shorter ribs with the quicker curves will part from each other at a lower point than the larger ones, and the "mitres" will occur at unequal

heights, as shown on the sketch below Fig. 111. The effort to get over this unsatisfactory and irregular iunction of the ribs at the springing was made first by setting back the feet of the shorter ribs on the impost capping, somewhat in the rear of the feet of the larger ribs, so as to throw their parting point higher up; but this also was only a makeshift, which it was hoped the eye would pass over; and in fact it is rarely noticeable except to those who know about it and look for it. Still the defect was there, and was not got over until the idea occurred of making all the ribs of the same curvature and the same length, and intercepting them all by a horizontal circle at the apex or ceiling of the vault, as shown in Fig. 110; the space between the circles at the apex of the vault being practically a nearly flat surface or *plafond* held in its place by the arches surrounding it; though, for effect, it is often treated otherwise in external appearance, being decorated (as in Henry VII.'s Chapel) by pendants giving a reversed curve at this point, but which of course are only ornamental features hung from the roof. If we look again at Fig. 109, we shall see that this was a very natural transition after all, for the arrangement of the ribs and vaulting surfaces in that example is manifestly suggestive of a form radiating round the central point of springing, though it only suggests that, and does not completely realise it. But here came a further and very curious change in the method of building the vault, for as the ribs were made more numerous, for richness of effect, in this form of vaulting (Fig. 110), it was discovered that it was much easier to build the whole as a solid face of masonry, working the ribs on the face of it. Thus the ribs, which in the early Romanesque and Norman vaults were decorative features constructed *over* the joining of the vaulting surfaces and after the vaulting surfaces had been built, after becoming in the middle Gothic period the constructive framework of the vault,

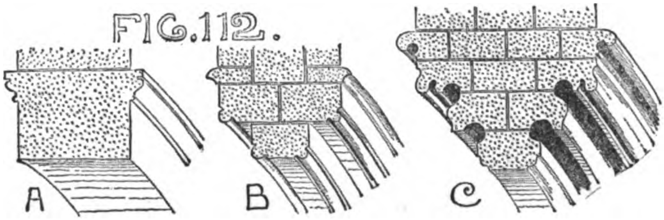
in the final form of fan-vaulting came back to their original use as merely a form of architectural expression, meant to carry on the architectural lines of the design; and they perform, on a larger scale and with a different expression, much the same kind of function which the fluting-lines performed in the Greek column. The fan-vault is therefore a kind of inverted dome, built up in courses on much the same principle as a dome, but with a convex plan internally instead of a concave one, the whole forming a series of inverted conoid forms* abutting against the wall at the foot, and against each other at their upper margins. This form of roof is wonderfully rich in effect, and has the appearance of being a piece of purely artistic work done for the pleasure of seeing it; yet, as we have seen, it is in reality, like almost everything good in architecture, the logical outcome of a contention with structural problems.

We have already noticed (page 101) the suggestion, in early Gothic or Romanesque, of the dividing up of a pier into a multiple pier, of which each part supports a special member of the superstructure, as indicated in Fig. 94. The Gothic pier, in its development in this respect, affords a striking example of that influence of the superstructure on the plan which has before been referred to. The peculiar manner of building the arch in Gothic work led almost inevitably to this breaking up of the pier into various members. The Roman arch was on its lower surface a simple flat section (A, Fig. 112), the decorative treatment in the way of mouldings being round the circumference, and not on the

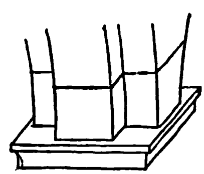


* The form of the fan-vault may be best realised if we imagine this figure to be revolved horizontally, on the line A B as its axis or hinge (like a door), through the space of a half circle; the space then passed through by the curve C D will represent the outer surface of one bay of the vault.

under side or *soffit* of the arch, and in early Romanesque work this method was still followed. The mediæval builders, partly in the first instance because they built with smaller stones, adopted at an early period the plan of building an arch in two or more courses or rings, one below and recessed within the other (B, Fig. 112). As the process of moulding the arch



stones became more elaborated, and a larger number of sub-arches one within another were introduced (C, Fig. 112), this characteristic form of sub-arches became almost lost to the eye in the multiplicity of the mouldings used. But up to nearly the latest period of Gothic architecture this form may still be traced if looked for, as the basis of the arrangement of the mouldings, which are all formed by cutting out of so many square sections, recessed one within the other. This will be more fully illustrated in the chapter on mouldings. We are now speaking more especially of the pier as affected by this method of building the arches in recessed orders. If we consider the effect of bringing down on the top of a square capital an arch composed of two rings of squared stones, the lower one only half the width (say) of the upper one, it will be apparent (see accompanying sketch) that on the square



capital the arch stones would leave a portion of the capital at each angle bare, and supporting nothing. This looks awkward and

illogical, and accordingly the pier is modified so as to suit the section of the arch. Fig. 113 shows four successive typical forms

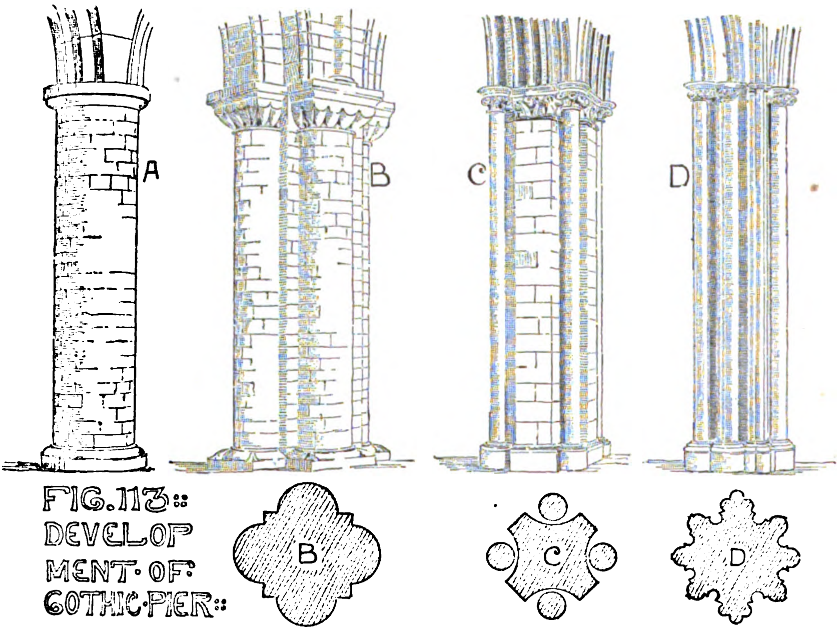


FIG. 113: DEVELOPMENT OF GOTHIC PIER:

which, with the plans B C D accompanying them, illustrate this development of the pier. A is a simple cylindrical pier with a coarsely-formed capital, a kind of reminiscence of the Doric capital, with a plain Romanesque arch starting from it; B is the kind of form (varied in different examples) which the pier assumed in Norman and early French work, when the arch had been divided into two recessed orders. The double lines of the arch are seen springing from the cap each way, in the sketch of the pier. If we look at the plan of the pier, we see that in place of the single cylinder it is now a square with four smaller half cylinders, one on each face. Of these, those on the right and left of the plan support the sub-arches of the

arcade; the one on the lower side, which we will suppose to be looking towards the nave, supports the shaft which carries the nave vaulting, and which stands on the main capital with a small base of its own (a common feature in early work); and the half-column on the upper side of the plan supports the vaulting-rib of the aisle. In C, which represents a pier of nearly a century later, we see that the pier is broken up by perfectly detached shafts, each with its own capital, and each carrying a group of arch mouldings, which latter have become more elaborated. D shows a late Gothic fourteenth-century pier, in which the separate shafts have been abandoned, or rather absorbed into the body of the pier, and the pier is formed of a number of moulded projections, with hollows giving deep shadows between them, and the capitals of the various members run into one another, forming a complete cap round the pier. This pier shows a remarkable contrast in every way to B, yet it is a direct development from the latter. In this late form of pier, it will be observed that the shaft which carries the vaulting-ribs of the nave, instead of springing from the capital, as in the early example, B, springs from the floor, and runs right up past the capital; thus the plan of the vaulting is brought, as it were, down on to the floor, and the connection between the roofing of the building and its plan is as complete as can well be. In C the vaulting-shaft is supposed to stop short of the capital and to spring from a corbel in the wall, situated above the limit of the drawing. This was a common arrangement in the "Early English" and "Early Decorated" periods of Gothic, but it is not so logical and complete, or so satisfactory either to the eye or to the judgment, as starting the vaulting-shaft from the floor line. The connection between the roofing and the plan may be further seen by looking at the portion of a mediæval

plan given under Fig. 99 (page 104), where the dotted lines represent the course of the groin-ribs of the roof above. It will be seen how completely these depend upon the plan, so that it is necessary to determine how the roof in a vaulted building is to be arranged before setting out the ground plan.

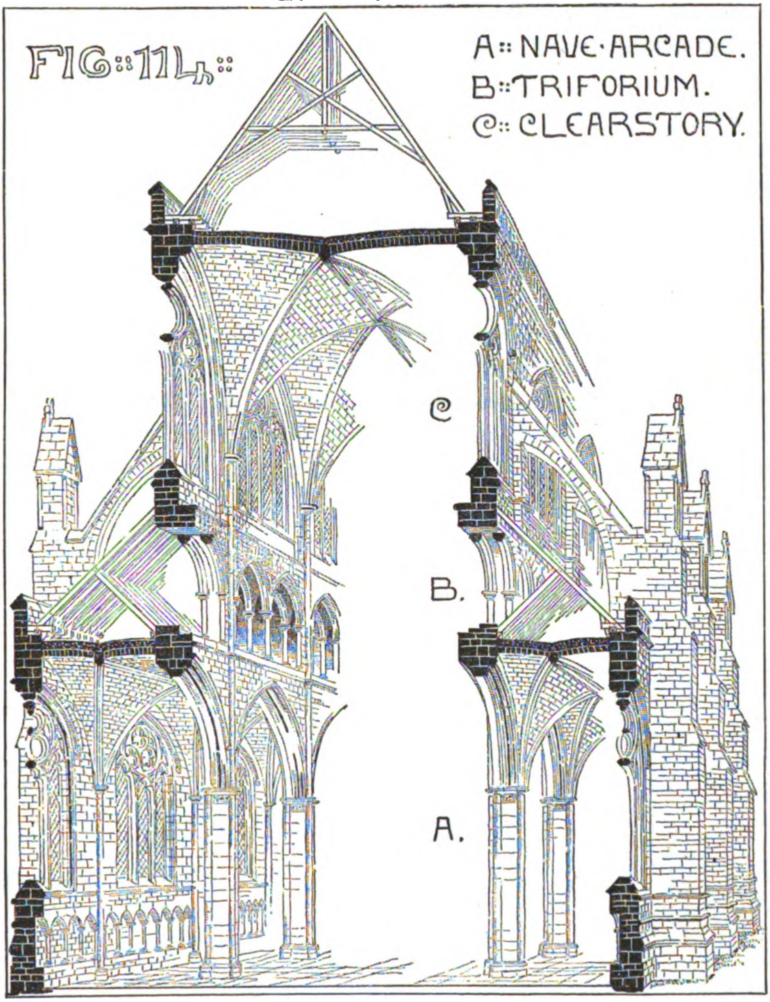
Thus we see that the Gothic cathedral, entirely different in its form from that of the Greek temple, illustrates, perhaps even more completely than the Greek style, the same principle of correct and truthful expression of the construction of the building, and that the main features which give to the style its most striking and picturesque effects are not arbitrarily adopted forms, but are the result of a continuous architectural development based on the development of the construction. The decorative details of the Gothic style, though differing exceedingly from those of the Greek, are, like the latter, conventional adaptations of suggestions from nature; and in this respect again, as well as in the character of the mouldings, we find both styles illustrating the same general principle in the design of ornament, in its relation to position, climate, material; but this part of the subject will be more fully treated of in a succeeding chapter.

We have now arrived at a style of architectural construction and expression which seems so different from that of Greek architecture, which we considered in the last chapter, that it is difficult to realise at first that the one is, in regard to some of its most important features, a lineal descendant of the other. Yet this is unquestionably the case. The tall slender shaft of Gothic architecture is descended, through a long series of modifications, from the single cylindrical column of the Greek; and the carved mediæval capital, again, is to be traced back to the Greek Corinthian capital, through examples in early French architecture, of which a tolerably complete

series of modifications could be collected, showing the gradual change from the first deviations of the early Gothic capital from its classical model, while it still retained the square abacus and the scroll under the angle and the symmetrical disposition of the leaves, down to the free and unconstrained treatment of the later Gothic capital. Yet with these decided relations in derivation, what a difference in the two manners of building! The Greek building is comparatively small in scale, symmetrical and balanced in its main design, highly finished in its details in accordance with a preconceived theory. The Gothic building is much more extensive in scale, is not necessarily symmetrical in its main design, and the decorative details appear as if worked according to the individual taste and pleasure of each carver, and not upon any preconceived theory of form or proportion. In the Greek building all the predominant lines are horizontal; in the mediæval building they are vertical. In the Greek building every opening is covered by a lintel; in the Gothic building every opening is covered by an arch. No two styles, it might be said, could be more strongly contrasted in their general characteristics and appearance. Yet this very contrast only serves to emphasize the more strongly the main point which I have been wishing to keep prominently before the reader—that architectural design, rightly considered, is based on and is the expression of plan and construction. In Greek columnar architecture the salient feature of the style is the support of a cross lintel by a vertical pillar; and the main effort of the architectural designer is concentrated on developing the expression of the functions of these two essential portions of the structure. The whole of the openings being bridged by horizontal lintels, the whole of the main lines of the superstructure are horizontal, and their horizontal status is as strongly marked as possible by the terminating lines

of the cornice. The whole of the pressures of the superstructure are simply vertical, and the whole of the lines of design of the supports are laid out so as to emphasize the idea of resistance to vertical pressure. The Greek column, too, has only one simple office to perform, that of supporting a single mass of the superstructure, exerting a single pressure in the same direction. In the Gothic building the main pressures are oblique and not vertical, and the main feature of the exterior substructure, the buttress, is designed to express resistance to an oblique pressure; and no real progress was made with the development of the arched style until the false use of the apparent column or pilaster as a buttress was got rid of, and the true buttress form evolved. On the interior piers of the Gothic arcade there is a resolution of pressures which practically results in a vertical pressure, and the pier remains vertical; but the pressure upon it being the resultant of a complex collection of pressures, each of these has, in complete Gothic, its own apparent vertical supporting feature, so that the plan of the substructure becomes a logical representation of the main features and pressures of the superstructure. The main tendency of the pointed-arched building is towards verticality, and this vertical tendency is strongly emphasized and assisted by the breaking up of the really solid mass of the pier into a number of slender shafts, which, by their strongly-marked parallel lines, lead the eye upward towards the closing-in lines of the arcade and of the vaulted roof which forms the culmination of the whole. The Greek column is also assisted in its vertical expression by the lines of the fluting; but as the object of these is only to emphasize the one office of the one column, they are strictly subordinate to the main form; are, in fact, merely a kind of decorative treatment of it in accordance with its function. In

the Gothic pier the object is to express complexity of function, and the pier, instead of being a single fluted column, is broken



up into a variety of connected columnar forms, each expressive of its own function in the design. It may be observed also

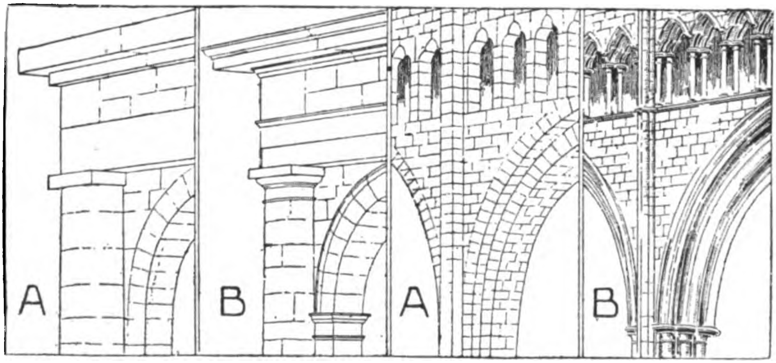
that the Gothic building, like the Greek, falls into certain main divisions arising out of the practical conditions of its construction, and which form a kind of "Order" analogous to the classic order in a sense, though not governed by such strict conventional rules. The classic order has its columnar support, its beam, its frieze for decorative treatment. The Gothic order, as shown in the sectional sketch of such a building given in Fig. 114, has its columnar support, its arch (in place of the beam), its decoratively-treated stage (the Triforium), occupying the space against which the aisle roof abuts, and its clerestory, or window stage. All these arise as naturally out of the conditions and historical development of the structure in the Gothic case as in the Greek one, but the Greek order is an external, the Gothic an internal one. The two styles are based on constructive conditions totally different the one from the other; their expression and character are totally different. But this very difference is the most emphatic declaration of the same principle, that architectural design, in its highest form, is the logical but decorative expression of plan and construction.

CHAPTER IV.

ARCHITECTURAL MOULDINGS.

HAVING considered the relation between construction and expression in architecture in the wider sense, and as exemplified in the two most complete and logically designed styles of architecture that have existed, we have now to consider the details which add further expression and decorative effect to the design. These details may be divided into two classes: mouldings and decorative work.

Mouldings form a source of architectural expression, generally entirely overlooked by the average spectator. That they are, however, details of the highest importance will be obvious



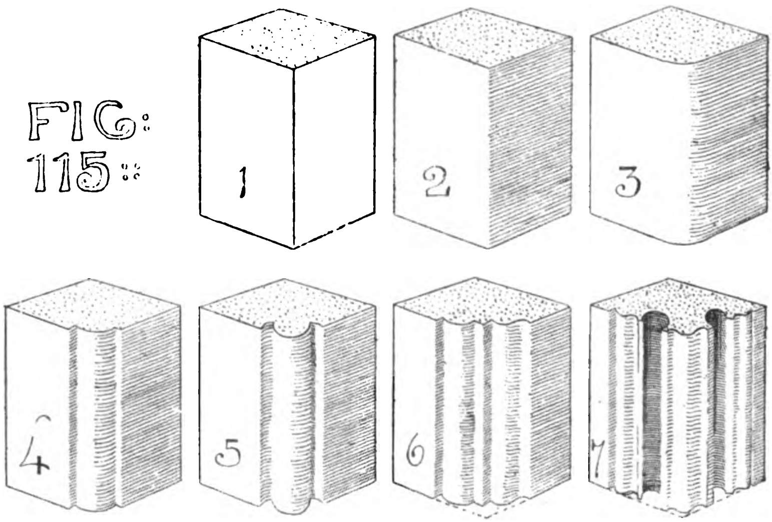
A, A: WITHOUT MOULDINGS. B, B: WITH MOULDINGS.

at once to any reader who will compare the accompanying

sketches, exhibiting the leading features of Roman and Gothic respectively, with and without mouldings. To architects and scientific students of architecture the mouldings are in fact the most interesting and important details of a building or of a style. From an archæological point of view the mouldings are, in all styles of the pre-Renaissance period, the most trustworthy internal evidence as to the approximate date of a structure; but they have a higher interest and value even than this, for the method of designing the profiles of mouldings is the surest test of refinement in architectural style, and forms the most definite distinction between a pure and refined and a corrupt or barbarous style of architecture.

Moulding may be defined as a means of modelling the surface of stone or other material in curves or sinkings of the surface, all worked in a parallel direction, so as to produce to

FIG: 115:



the eye parallel lines of shadow, light, and half-light. If we take a piece of squared stone set up on end, such as might

form part of the side of a door or window opening, and place it as in No. 2 in Fig. 115, so that the front plane should be in sunlight and the side plane in shadow, we see a distinctly defined line of demarcation where the plane in light and the plane in shadow meet. If we had to represent this block without the use of shading, we should have to define the meeting of these two planes by a black line, as at No. 1; but it must be remembered that such a representation is only a conventional one; there is no visible *line* in fact, there is only the change in the direction of the plane, which causes a change in the reflected light from the surface; and if we could get the sunlight reflected with equal intensity from both the planes we should lose the angle to the eye, as in fact sketchers both from architecture and from nature know that they sometimes do lose the visible angle of an object entirely in certain positions and in a diffused sunlight, and where the colour of the object is identical on each plane, and have to change their position and their relation to the light in order to distinguish the meeting angle. But where the sunlight is reflected at a different angle to the spectator from each plane, or where one plane is in light and the other in shadow, the meeting of the two differently lighted planes forms a continuous line or edge; we have a lighter band and a darker band distinctly defined. Now this is what all moulding consists in: it is the production of varying lines of light and shadow by varying the planes of the surface in reference to the spectator and to the light. But in order to produce the best effect these variations of plane must be decisively marked and grouped. If we were merely to round off the edges of the stone, as in No. 3, we should produce a variation in the light on the surface, no doubt, but in a very weak and ineffective manner, not adding any form of definition of line to the angle, but taking away the one

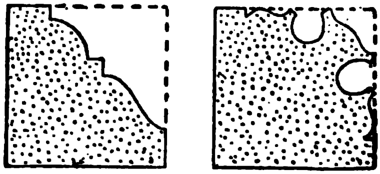
definite edge-line which previously existed. Now the object of moulding the surface is to increase the force and expression of an architectural member, by breaking it up into distinctly defined parallel planes, so as to substitute for the two simple bands of light and shadow, with their single meeting edge, a greater number of distinctly defined bands of light and shadow, defining the direction of the architectural member, whether vertical, horizontal, or curved, by a number of bands instead of the one single meeting edge or *arris* (as it is technically called) of the squared stone. But if we sink the rounded portion below the main surface of the stone on each face, as in No. 4, we then have several distinctly marked planes giving as many bands to the stones; we have a thin line of shadow from the first sinking, then a light graduating into shadow on the rounded member, then a line of light from the sinking at the other side. This, which is a common form of moulding in Roman as well as in Early Gothic architecture, and, in fact, is to be found occasionally in almost every style of architecture, may be taken as a typical example of the method and object of moulding. The object is to give stronger emphasis to some part of the structure by thus marking it out in parallel lines; the method is so to model the surface that each member of the moulding shall be distinctly marked off from its neighbour by a decisive change in the angle, and consequently in the reflected light of the surface. In No. 4 the rounded member is defined by the sinking at each side of it; it might be otherwise defined, as in No. 5, by working the roll out of the original surface of the stone, but carrying it round beyond the half circle, so as to cut a niche into the stone at each side, and give a strongly-marked shadow. This latter method, which gives a greater expression of force to the angle of the stone, is characteristic of complete Gothic work, as the former is more characteristic of

Classic or Romanesque work. The effect of both treatments is to give greater force to the angle of the stone, which, paradoxical as it may seem, is actually effected by cutting away some of its substance; but the Gothic form of the roll is specially suited to a climate where there is a comparatively dull light; it produces a dark shadow behind the roll and throws it up strongly; under a very strong sunlight it would be rather too marked, or at least it would be unnecessary for the production of the desired effect.

Having shaped the angle of our stone into a single moulding within its defining limits, we may go a step further and work on it two sets of mouldings, as in Nos. 6 and 7, which represent classic and Gothic types respectively; and we may go on elaborating this much further, as in the case of many mouldings of the mediæval period, which consist of a number of groups of mouldings, one under another, as we shall see further on. Mouldings may be grouped under four heads: (1) Flat surfaces placed at various angles, and which are almost invariably used in narrow strips as defining or dividing members; (2) Convex surfaces; (3) Concave surfaces; and (4) Surfaces of compound curves, combining convex and concave. Convex surfaces, and concave surfaces when turned upwards towards the light, always mean gradations of light and shadow; concave surfaces turned from the light, mean a sharply defined line of shadow on some part of their surface; compound curvatures may show either defined shadows or graduated light and shadow, or both, according to their position in reference to the light.

We have so far been regarding mouldings, as seen by the eye in execution, as surfaces reflecting light at various angles. But mouldings as designed by the architect are considered in profile. If we place the moulded pieces, numbered 6 and 7

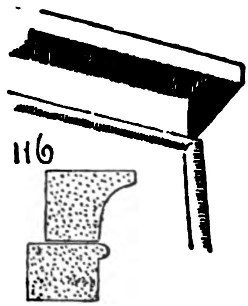
in Fig. 115, on their sides, and with the ends turned full towards us, we shall see them thus :—



and we then realise the fact that there is a balance and proportion of line and curve observed in drawing out these profiles, and that the outline or profile of a moulding is in itself a matter of design and draughtsmanship. It is in this way, in profile, that mouldings are always drawn when designed for execution on a building; and it is an important part of architectural art to be able to realise, in drawing the profile of a moulding, what will be its light and shadow effect when executed. It is difficult for the eye to realise the precise profile of a moulding from its light and shadow effect, but it is not the less the case that every refinement of line and curve in drawing the profile of a moulding has its result in adding delicacy and finish to the architectural expression of the building, and that mouldings which look clumsy in profile on paper will look coarse in execution, although their precise profile may not be traceable by the spectator. It is for this reason that the profiling of mouldings becomes, as observed at the commencement of this chapter, such a test of refinement of architectural style and design. A building which has coarse and ill-proportioned mouldings will almost certainly be coarsely designed as a whole; it is the work of designers who have no eye for refinement of line and proportion.

The profile of mouldings has been largely influenced, though probably unconsciously to the workers of them, by the nature

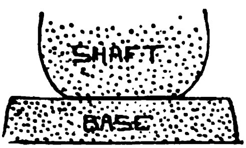
of the material in which they were executed and the atmosphere in which they were to be seen. The mouldings of Egyptian architecture were very few and very simple; the most prominent and the most frequently used is the form shown in Fig. 116, which forms the almost universal crowning moulding or finish of Egyptian buildings. This consists, as will be seen, mainly of one large concave member, the small convex projecting moulding at the foot of it being a defining member, marking off the point where the crowning moulding commences. Bearing in mind that Egyptian detail was often executed in granite of the hardest description, and was to be seen under a strong sunlight in a landscape almost destitute of tree shade, it will be seen how well this form of moulding is adapted to its material and situation; it has no small details, no deep cutting; and the single concave curve, which would lack force of effect in a northern atmosphere, in the strong sun of Egypt casts a strongly-marked shadow, sufficiently defining and emphasizing the crowning line of the building, as indicated on the perspective sketch, Fig. 116. In another position, the necking of a column, a type of moulding is used, in Egyptian work, which is still more indicative of the hardness of the material, consisting of a series of flat bands produced by sinking in intaglio below the main line of surface of the granite (see Fig. 67, page 74): the same expedient is used in the carving of many of the inscriptions and hieroglyphics on Egyptian buildings or sarcophagi; there is no relief, no extensive cutting away of material; it is all sunk from a uniform surface.



116

Regarded in profile, the Egyptian crown moulding is a very well-designed one, and indicates a refined perception of

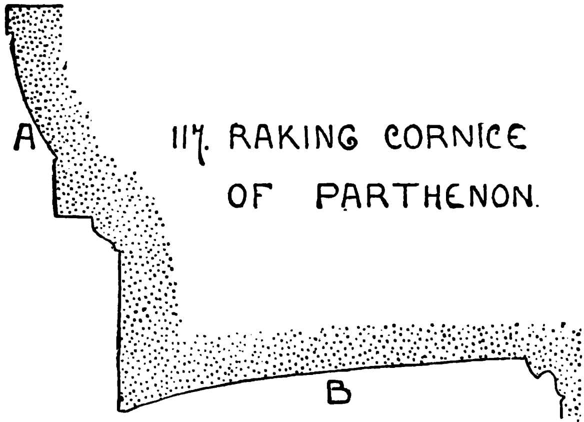
beauty of contour, which hardly appears in other details of Egyptian architecture.* It has been asserted that the curve is intentionally and accurately set out as a segment of an ellipse; this does not appear to rest on accurate measurement, and is open to considerable question,† but every one can see that the curve is a delicate and finely proportioned one, and gives a quite different impression, as to the education and artistic perception of the designers, from that which would have been conveyed by a mere quarter-circle profile, which could have been struck with a pair of compasses. But it is only when we come to Greek mouldings that we become fully conscious of the degree of refinement of taste and perception which can be exemplified in this class of architectural detail, and of the important influence of the profile design of the mouldings on the whole character of the architecture. Among Greek mouldings of the best period there is scarcely such a thing to be found as a mere segment of a circle; the only moulding found by Mr. Penrose, in his minute measurement of the Parthenon mouldings, which was a portion of a simple circle, was the crown moulding (A) of the raking cornice of the pediment, the section of which is shown in Fig. 117. All the others are curves deduced from the ellipse, the hyperbola, or the parabola, or sometimes from a union of two of these



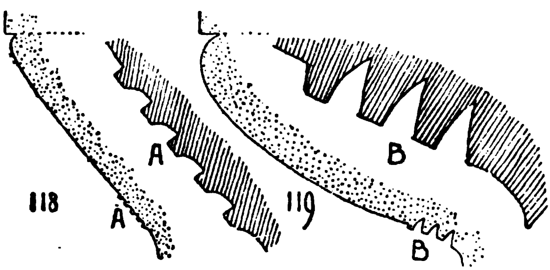
* The typical Egyptian base to a column, for instance, is singularly clumsy in design and proportion; if that and the crown moulding were seen apart, it would hardly be supposed that they were from the same style of architecture.

† The authority for the statement is the late Mr. Pennethorne, in his "Geometry and Optics of Ancient Architecture," but he does not offer any decided proof based on full-sized profiles, and his book generally conveys the idea that his theories of ancient architecture predisposed him to find geometrical method in everything.

curves; and they are modelled with a minute accuracy which indicates that the finish and mathematical completeness of

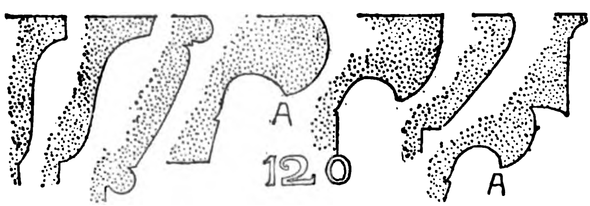


the curve was a matter of interest in itself to the architects, a kind of refinement of execution in which they delighted. Thus, in the Doric capital, the moulding immediately under the abacus is a hyperbola (Fig. 118), in which the long subtle curve



below the apex, almost approaching a straight line, gives the most delicate gradations of light, besides offering a beautiful outline profile to the eye at the exterior visible edge of the capital. If the reader wishes to appreciate the difference between the efiect o. refined and coarse moulding, he could hardly do so better than by comparing the outline of the

complete Doric capital of the best period, first with that of the archaic Doric from Selinonte, in Sicily (about 300 to 400 years older than the pointed Athenian Doric), and next with such an example as the Roman Doric capital from the Theatre of Marcellus, already referred to (page 57). The example from Selinonte (Fig. 119) recognises no proportion at all in the curve —it is simply a bulge; the Roman example (Fig. 54) is a commonplace quarter-circle, such as any one could draw with a pair of compasses, and heavy and inexpressive as compared with the delicately modelled outline of the Greek capital. Compare also the large square sinkings or bands at the base of the Roman moulding (Fig. 54) with the delicately-worked striated lines and hollows in the Greek capital, which divide off the capital from the shaft by a series of delicate shadow lines edged with light. Throughout a Greek building of the best period we find the same refinement in the mouldings. The under side of the projection of the cornice (B, Fig. 117), which is necessarily curved upwards underneath to allow the water to drip from it instead of running back to the wall, is also worked in a hyperbola curve, though a segment of a circle would have answered the practical purpose just as well;



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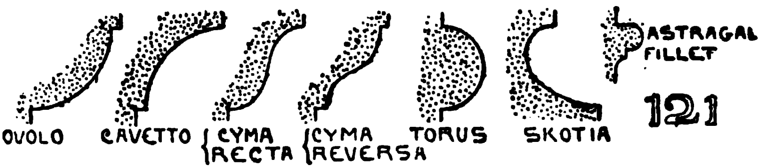
other examples which are here appended (Fig. 120) wil l serve to illustrate further the generally refined character of the profiles of Greek mouldings, and the beauty and balance of curvature which they display. Some of these also serve, especially when

contrasted with Gothic mouldings, to illustrate what has been said as to the relation of mouldings to the material in which they are worked. Some of these mouldings, especially that sometimes called the "bird-beak moulding" (A, Fig. 120), are obviously only suited to a hard fine-grained material like marble; in a coarser-grained stone, the thin edge at A would be apt to chip and crumble with the action of the weather.

Considering the beauty and intellectual interest of these Greek Doric mouldings, it is remarkable how little they were known, and how little influence they exercised on the world of architecture, during all the period from the subjugation of Greece by the Romans until a very recent date within the present century. The Roman conquerors had no eye for the refinement of the Athenian architect in such details as these; or if they paid any attention to them, only travestied and vulgarised them. The Renaissance architects knew nothing but Rome, and all their work was based upon Roman details; there was little travelling then, and the renown of Greek art had disappeared from the knowledge of civilised Europe. Consequently the mouldings known and illustrated in most of the Renaissance books on classic mouldings are all Roman in their immediate origin, though some of them are no doubt derived from the Greek Ionic style. The names now and for some centuries attached to them (some of the names are as old as Vitruvius) are of a significantly polyglot character, indicating the different countries and times in which they were adopted. The types of classic mouldings as known in the architectural instruction books of the post-Renaissance period are these (Fig. 121): the *ovolo*, or convex quarter-circle, and the *cavetto*, or concave quarter-circle, both named in Italian; the *cyma*, which was the Latin form of the Greek *κῦμα*, "a wave," a name appropriately given to a form consisting of two reversed curves forming an

undulating outline, this moulding being classed (in Latin) as *cyma recta* when the concave portion was uppermost, and *cyma reversa*



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when the convex curve was uppermost; the *torus* (Latin, "a rope"), a half-round projecting member; the *scotia* (Greek σκοτία, "darkness"), a concave moulding, sometimes a concave half-round (the reverse of the *torus*), more often a compound or elliptic curve, which was constantly used in the bases of classic columns to give a shadow between the projecting members, hence its characteristic name; the *astragal* (Greek, ἀστράγαλος, the vertebra between the head and neck), a name probably adopted in consequence of the usual position of the astragal as the necking of a column, perhaps also in reference to its shape as a small rounded member (a kind of diminutive *torus*), a second meaning of "astragal" being a small bone; and the *fillet* (apparently the French *filet*, a thread or string, so that this term must have come in during the later days of the Renaissance), which was simply a narrow strip of flat surface used to divide other mouldings, or to mark the junction between a group of mouldings and the plain wall surface. These mouldings, known by these names, are tabulated in all the old standard books on classic architecture, and most of them have passed into the English workman's vernacular, so it is useful to know them, though of course their mere names are of no real consequence to the subject, and the mouldings themselves by no means represent all the possible mouldings which can be suitably made use of in classic architecture. They have, however, been

used with satisfactory effect in many thousands of buildings, and their usual employment by the orthodox architects of the Renaissance affords no bad lesson as to the manner and object with which mouldings should be applied. Each of these forms of moulding has its own constructive expression, which determines, within certain limits, the manner and position in which the moulding should be applied. Thus, the *torus*, the heaviest in appearance of all, is mostly restricted to use in bases, and the *scotia* nearly so in orthodox classical practice, the two giving a forcible contrast of convex and concave, light and dark; the *cavetto* and the *cyma recta* were mostly used as crowning mouldings, their upper portion being hollow and not conveying the idea of giving support to a member above it; a small *cavetto* is sometimes used as a supporting member, but it has rather a weak effect. A modified form of the *cavetto*, faced upwards, is a not uncommon feature in Greek bases, as in the base of the monument of Lysicrates (Fig. 122), and in the accompanying example from Bassæ, where the lower part of the base is formed by a large and a small *cavetto* in conjunction; not a good form, as there is a weakness in the appearance of the sharp edge left (A) at the meeting of the two members. The *ovolo* and *cyma reversa*, having more of a bracket form in their outline, are generally used to support other members, though the *ovolo* is sometimes used as a crowning member, where a rather heavy and powerful effect is aimed at, as in the entablature of the Tuscan Order designed by Serlio (Fig. 123), where the object is to convey an expression

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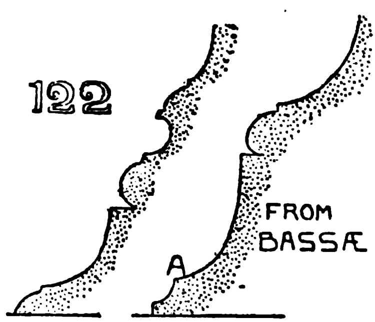
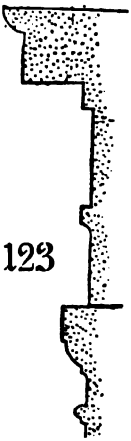


of stern and massive simplicity; here the mouldings which in other cases would have curvilinear sections, are all square, and in the crown moulding the quarter-circle, the heaviest curve that could be employed, is substituted for the lighter and more graceful *cyma* or *cavetto;* this is a typical example of the special treatment of mouldings to produce a special expression.



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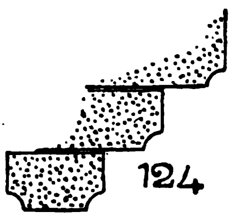
Reference has been made in the last chapter to the radical distinction between the Roman and the Gothic manner of arch building, and it was shown how the Gothic arch, from an early period and while the semicircular form was still retained, became a system of a succession of arches one within another. In its simplest form this would be represented by such a section as Fig. 124, a succession of arch rings of square stone one within another, with the edges, perhaps, taken off by a splay or a slight hollow. The next step is to further emphasize the edges of these arches by cutting them into a moulding, of which one of the most usual forms is a roll with



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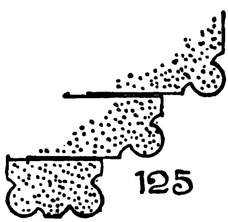

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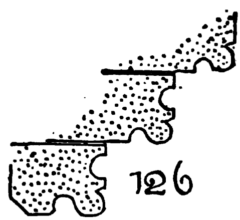
EARLY TWELFTH CENTURY.



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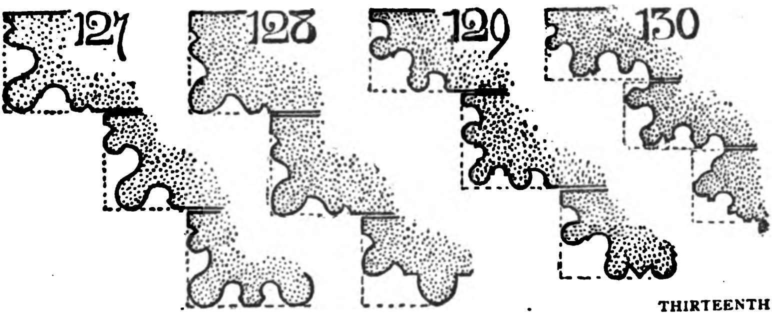
LATER TWELFTH CENTURY.

a nick at each side to define it (as shown in one of the typical examples of moulding in Fig. 115), illustrated in Fig. 125. A further degree of elaboration may be given by adding completely worked-out hollows beside the angle-

rolls, as in Fig. 126; and a yet further elaboration is shown in the section from New Shoreham Church (1170), Fig. 127. Here it will be seen also that the roll moulding of the second order of arches does not quite come up to the original square section of the stone, which, however, is clearly traceable in the upper and lower arches. The next example (128), also from



LATE TWELFTH CENTURY. THIRTEENTH CENTURY.

New Shoreham, shows a different form of the angle moulding, with a slight point or edge to it, and here the two upper arches preserve the square outline, while the lower one quits it. In the more elaborate example from Wells (1180), Fig. 129, we see that all the three arch-stones are cut away a good deal from the dotted line which shows the original section of the stone, but still the appearance of three separate sets of mouldings one beneath the other is preserved, and coincides with the jointing of the stones, which is carefully shown in all these sections,* so that the reader may see the way in which the moulding is built up. The example from

* The last four figures are reduced from sections in Sharpe's "Mouldings of the Six Periods of Gothic Architecture." Figs. 132 to 137 are from the same valuable collection of Gothic mouldings.

Worcester (1230) shows almost the whole of the original square section furrowed into mouldings (Fig. 130), the position of the joints, however, still telling the story of the original genesis of such a moulding.

At this point the reader may be asked to compare the character of these mouldings, executed in friable stone and for a northern atmosphere, with that of the Greek mouldings executed in marble and for a sunny atmosphere. It will be seen how completely the large bold rounds and hollows of the Gothic moulding suit the nature of the material in which they are executed, both in regard to facility of execution and durability: they are much less refined in profile than the Greek mouldings, but their rolls and hollows give the powerful effect required under a comparatively misty light, and show the intuitive perception of the builders as to the means necessary for producing the desired effect. The peculiarly *stone* character of these mouldings, especially of the rounded scooped-out hollows, is more emphatically illustrated by comparing them with the accompanying section of a moulding in oak (Fig. 131), from the splendid choir screen now in Lancaster parish church (but probably not originally belonging thereto). Here it will be seen that the sinking which in stone moulding was a rounded hollow, a form which would be very troublesome to execute in hard wood in a case where it is so much undercut (where the interior hollow is wider than the external opening), becomes instead a narrow pointed hollow or niche of a quite different form, though the external effect of the moulding is much the same as the stone form. In the stone mouldings it will be observed that the convex and concave curves, instead of being, like those of the Greeks, scientifically designed on the basis of geometrical

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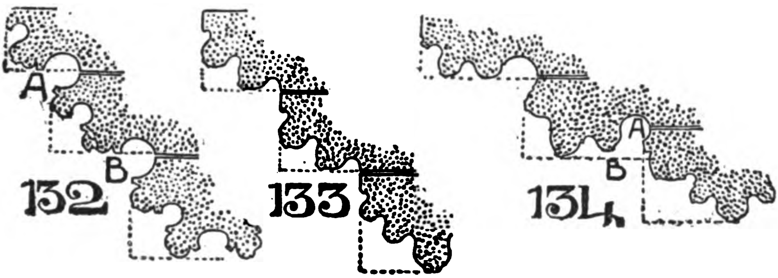
curves, seem almost studiously to avoid regularity of curve; in the hollows especially it is rarely that a perfect segment of a circle is found. The profiles were probably chalked out boldly by hand, and then the "templets" or guides for the section cut from the hand-drawn line.

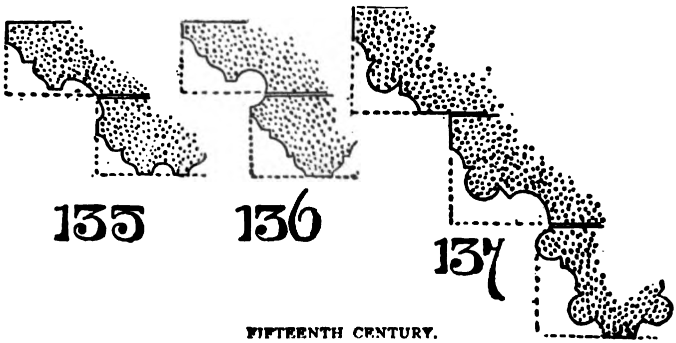
When we come later in the Gothic style, we find that frequently the original inner angle or joint of the arch-stones is lost and hidden in a hollow, which is worked half out of one stone and half out of another, as in the example from Lichfield (1275), Fig. 132; a method which enabled the mason to work very deeply undercut hollows with much more ease than if the



LATE THIRTEENTH CENTURY. FOURTEENTH CENTURY.

whole hollow had been worked out of one stone. At the points A and B, however, it will be seen that the moulding still retains its impress of having been worked out of a square stone, those two "fillets" being in fact part of the original surface of the stone out of which the moulding is worked. In the example from Selby Abbey, Fig. 133 (1280), the fillets have abandoned this square position, and show an inclination towards the oblique plane. Later on we sometimes find the visible evidence of the original form of the stones almost entirely lost in the elaboration of the moulding, as in the example from Lichfield, Fig. 134 (1330). Here it will be observed that the mouldings of the second arch fall forward in front and overhang those

of the lowest arch, producing a very rich effect, which, however, is obtained at the expense of cutting a good deal of stone to waste, as the part of the stone which forms the joint with the lower arch (at A) has all to be cut back from its original surface (B). This is a defect; in good building all materials ought to be so used as to involve as little cutting to waste as possible. Finally, in the latest period of Gothic, the general run of the moulded surface becomes almost entirely oblique, and the old boldly cut rounds and hollows are replaced by easily worked ineffective shallow mouldings, as in Figs. 135 to 137, from Lancaster, Newark, and Coventry, without either the



FIFTEENTH CENTURY.

refinement of classic mouldings or the power and effectiveness of the earlier Gothic ones: the style was in its decline, and the fact shows itself emphatically in the mouldings, which are worked in a cheap, easy, ineffective manner, quite in contrast with the earlier ones, in which no trouble seems to have been thought too great for the production of a striking and forcible effect.*

* The Gothic mouldings given in this chapter are all taken from English examples, because in this respect English Gothic work is superior to that of any other country, French Gothic mouldings being very inferior to English both in variety and effectiveness. In their own way, the English mediæval architects had almost as keen a perception in the design and balance of mouldings as the Greeks.

The consideration of these two schools of moulding will be sufficient to give the reader an idea of what is the principle and process of architectural moulding. In regard to the distribution of mouldings in the existing styles of architecture of the past, it may be observed that, as a rule, the more we approach the tropics the less there is of moulding: inhabitants of tropical countries have generally a love of rich colour, and in their buildings prefer to seek effect from flat expanses decorated with colour in the form of painted or inlaid decoration, rather than by the light and shadow effect of mouldings. In countries such as India, and in Moorish architecture, we find a tendency to widely projected eaves of roofs, to form a partial shelter from the sun, and these cast a deep shadow; but otherwise the architectural styles of tropical parts of the world show a tendency to flatness of surface and an absence of mouldings, the effect depending on colour and surface elaboration; and it is noticeable that what mouldings there are in such polychromatic architecture are usually very inferior in profile design and in refinement of effect to the mouldings of more northern styles. The effects from surface colour and from moulding seem to be, to a great extent, exclusive of one another, and where there is a keen enjoyment of colour there is little care or intellect bestowed on the designing of mouldings.

In general, as has been observed, the effect of mouldings is to emphasize and add force to the design at the point where they are introduced, though this is not invariably the case, and depends to some extent on the character of the mouldings themselves, which may be designed so as to impart lightness or to impart strength of appearance, according to the manner in which they are designed. In the architrave of the Ionic and Corinthian orders, for instance, the system of slightly

recessing the face by a "fillet," so as to divide it into two or three faces (which may be regarded as a very simple form of moulding), is used, as remarked on page 71, to give a certain lightness to the architrave in keeping with the light and graceful character of the order, as compared with the weight and severity of the Doric style, where the architrave is in one unbroken face. It will be seen also that the simple square projection at the upper part of the Doric architrave (Fig. 138), has an effect of greater power than the moulding which takes its place on the architrave of the monument of Lysicrates, for example (Fig. 139).

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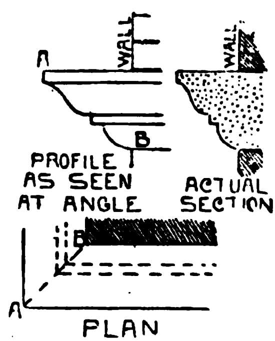
Whether mouldings are of a light or of a heavy and forcible character, however, their function is to emphasize, by lines of light and shadow, the portion of the building in which they occur, and to distinguish the main lines or divisions of a building. Thus, when a building is divided up into horizontal stages, these are marked usually by bands of stone (or brick, if it is a brick building) moulded in the direction of their length, and which, as previously observed, are called in building language *string-courses* (A, A, Fig. 140); and the moulded cornice, which forms the crowning feature of the wall, is only a final string-course, deeper and more highly elaborated, so as to

dominate all the others and assert its place as the crowning member. The designing of the mouldings of the various string-courses in a building is a very important and delicate matter, demanding much more care and attention than it sometimes receives. The same profiles and members should not be repeated in different situations, which would produce an effect of monotony; besides which, various situations require various treatment: a thin and light succession of lines in one place, a deep shadow and a broad light in another; and those who are really careful with mouldings, after drawing them in profile full size, will have their lines reduced exactly by scale on to a rather large-scale "detail elevation," to judge the better of their effect in relation to the whole. In designing the full-sized profiles of mouldings, it is necessary to bear in mind that the only situation at which their profiles when executed become visible to the eye is at the external angles of the building, and that they join there in most cases at an angle of 45°, and consequently, when viewed across the corner obliquely (which in most positions of the spectator they will be) their projection becomes exaggerated, as shown by the accompanying diagram, and a moulding which appears well-proportioned on paper may thus appear to have too much projection for its height when seen in execution.



The subject of mouldings is one which is usually almost entirely neglected by amateur students of architecture, and regarded (if thought of at all) as a mere form of technicality interesting only to the professional architect. It is hoped the foregoing summary of the subject will be sufficient to convince the amateur reader that it is one of no little interest

and importance, and that without some knowledge of it he cannot possibly appreciate the *nuances* of architectural design, nor understand fully the qualities which distinguish a refined and cultivated style of architecture from that which, however powerful in general effect, is coarse and inartistic in feeling. It may happen to the reader at some time to be a member of a committee to decide on the selection of a design in a competition for some important building. If he has been at some pains to train his eye to understand the effects of mouldings, and the difference between well-designed and ill-designed profiles, he may be pretty well assured that he will find himself the one person among the non-professional members of the committee who will be able to exercise any real discrimination as to the relative artistic merit of the designs submitted, and the architectural proficiency of their authors.

CHAPTER V.

ARCHITECTURAL ORNAMENT.

MOULDINGS, although they are not infrequently accompanied or enriched in effect by continuous bands of ornament running along some of the members of the moulding, are not in themselves regarded or classed as "ornament" in the true sense of the word. Carved decorative ornament, properly so called, is distinct from moulding in this, that while moulding is a shaping of the surface which is carried along continuously, decorative carving is a shaping of the surface which is varied longitudinally, either regularly or irregularly, as it proceeds. Carved ornament may be applied on the surface of a large moulding, but it is not in itself moulding. Besides carved ornament, in relief or in intaglio, we can also employ painted or inlaid ornament, which is obtained by variation, not in the modelling, but in the colour, of the surface treated; and this also may be applied on the surface of a moulding. Finally, ornament, though often applied in longitudinal or vertical bands, may also be applied over a superficies, without any special development in one direction or another, but merely to give life and interest to an otherwise plain wall surface.

Although, as has been shown, mouldings are almost a necessity to architectural expression, ornament is not so by

any means. The architectural expression may be complete, and very strongly marked and characteristic, without the introduction of any ornament. The object of architectural ornament is, in the first place, to add to the richness of a building when it is regarded as a whole; and secondly, to give the eye something for enjoyment and interest on a nearer view, and when examining the building in detail. The placing and distribution of the ornamental detail may, however, exercise considerable influence on the effect and expression of a building; but before analysing the relation of ornament to the general design it may be well first to consider ornament in itself—what it is, and how it is produced.

Architectural ornament, whether modelled or flat (inlaid), is divisible into two classes: ***abstract*** ornament, or such as is founded only on abstract geometrical forms (such as circles, squares, triangles, or portions of these), arranged on some symmetrical system; and ***natural*** ornament, which is founded on a more or less close imitation of the physical growths of nature. There are, indeed, early forms of architectural ornament which are to be traced purely to the imitation of obsolete constructional details. The stone railing of the Sanchi Tope in India, for instance (Fig. 141), is nothing in the world but a reminiscence of a wooden railing with broad-headed pins to keep it together, and with these pins surviving as circular carved bosses. A curious Egyptian ornament, of which a sketch is subjoined, is produced by the repeated forms of painted earthen jars, of the same shape but in two different tints, and painted overlapping, one

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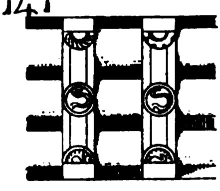
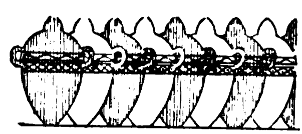
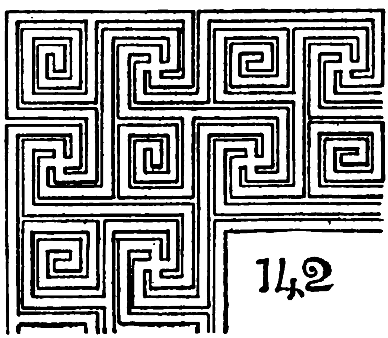




vase hiding half the next one, etc. This arrangement produces a decorative effect, but it is one in which we feel that there is a false element; the form of the jar contributes nothing to the decorative effect; any other form of good lines would have done as well; it is the effect of repetition and alternation alone that was aimed at, and hence the jar form is a mere impertinence; abstract forms are all we require. It is the special character of ornament of this class that it *means* nothing; it simply deals with abstract form. There are two main kinds of abstract ornament; geometrical, which covers a space, and repeating or alternating ornament, which is arranged in a linear succession in one direction. As examples of geometrical ornament may be taken the well-known square pattern called the Greek fret, or sometimes the "key-pattern" (Fig. 142); a type of ornament which can also be used as a linear ornament; which has existed in one form or another all over the world at various times; and which, in its best form as designed and used by the Greeks, has held its own for two thousand years and more, and now seems as little likely to go out of favour as ever.* It is an ornament that seems to combine in itself all the requisites or attributes of a geometrical ornament for general application: it may be used either in a very simple



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* It is at present a favourite and common ornament for the bordering of the lining of first-class carriages on English railways.

form, or it is capable of a considerable amount of complexity· it is not difficult to execute; its square precise forms

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are essentially architectural, and seem as if they belonged naturally to building, and it fills up very evenly and fully the space in which it is introduced. Of the same order are the apparently much more complex forms of Saracenic interlacing ornament (Fig. 143), which on analysis will be found not so complex as they appear at first sight; the multiplicity of parts in many of them is puzzling to the eye, but the key to them is very soon mastered. Both these and the Greek fret illustrate one of the

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requirements to give interest to ornament of this class, viz.: that it should present to a certain extent a problem to the eye; it should give evidence of thought and contrivance. It is perhaps on this account that these forms continue to give pleasure and to be accepted, while such an ornament as the guilloche (Fig. 144) is felt to be commonplace and threadbare, because its construction is so manifestly simple, and the eye takes it all in at once.

The other type of abstract ornament is that which consists, as observed, in the arrangement of repeating or contrasting forms for the sake of repetition or contrast of form. For in most ornament, and in abstract ornament more especially, repetition at equal distances is an essential element. If we draw two parallel lines and arrange broad black bars across the space at right angles to the lines, at irregular intervals

(A, Fig. 145), we produce nothing whatever but irregular markings; but if we arrange our bars at equal distances (B), we

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have at once a very simple form of ornament. If we modify each alternate bar in some way, either by making it shorter or thinner, or in some way differing from the intermediate one (C, D), we have gone a step farther, and got a dual element —an alternation of contrasting forms. Similarly, if we arrange circles in a regularly spaced order (F), we have a beginning of ornament; if, after spacing them at a little distance apart, we insert a contrasting and narrower form of any kind between the circles (G), we have again the principle of alternation, in this case between a broad and narrow form, which is the type of alternating ornament most frequently met with. In H we have gone a step further by emphasizing the centres of the circles, and developing the alternating figure a little more. One very common example of this alternating type is the "egg-and-tongue" or "leaf-and-tongue" ornament (146) of the Greeks; another is the "bead-and-reel" ornament (147). This tendency to the use of two contrasted and alternating forms is found everywhere where ornament has been attempted; there are numerous examples of it in Egyptian ornament (148); it is seen in the beautiful Greek ornament (belonging to the "natural" type) given in Fig. 149; and here is a sketch of a necklace from the Pelew Islands (150), in the British Museum, composed of an alternating arrangement of round seeds or pods with three little flat shells strung between and

alternating with them, which is exactly the Greek bead-and-reel ornament in a somewhat rougher form; the taste for this alternating arrangement being apparently innate in mankind; at all events, quite prehistoric in its origin.


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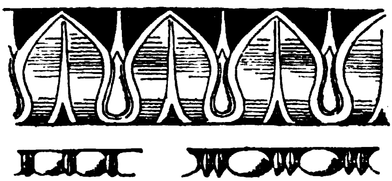
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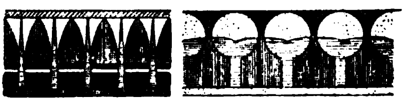
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Natural Ornament is that which is founded on the imitation of the forms of growth in nature, but this by no means implies direct imitation of nature; on the contrary, the best ornament of this class in the world is very far from being an imitation of nature, and we may even go so far as to say that as soon as it becomes direct imitation of nature it ceases to be ornament in the true sense. For ornament implies *design*, which is a matter of thought and invention, not of copying. The reasons for this principle, which has been tacitly and intuitively adopted, at least, if not consciously, in all those which the world has agreed to recognise as the best schools of ornament, are perhaps threefold. In the first place, it is the natural desire of man, when he turns to artistic work, to create something of his own; but we are not made so that we can absolutely originate anything; we take hints from nature, and upon their basis make our own sub-creations. Then, in the materials which are

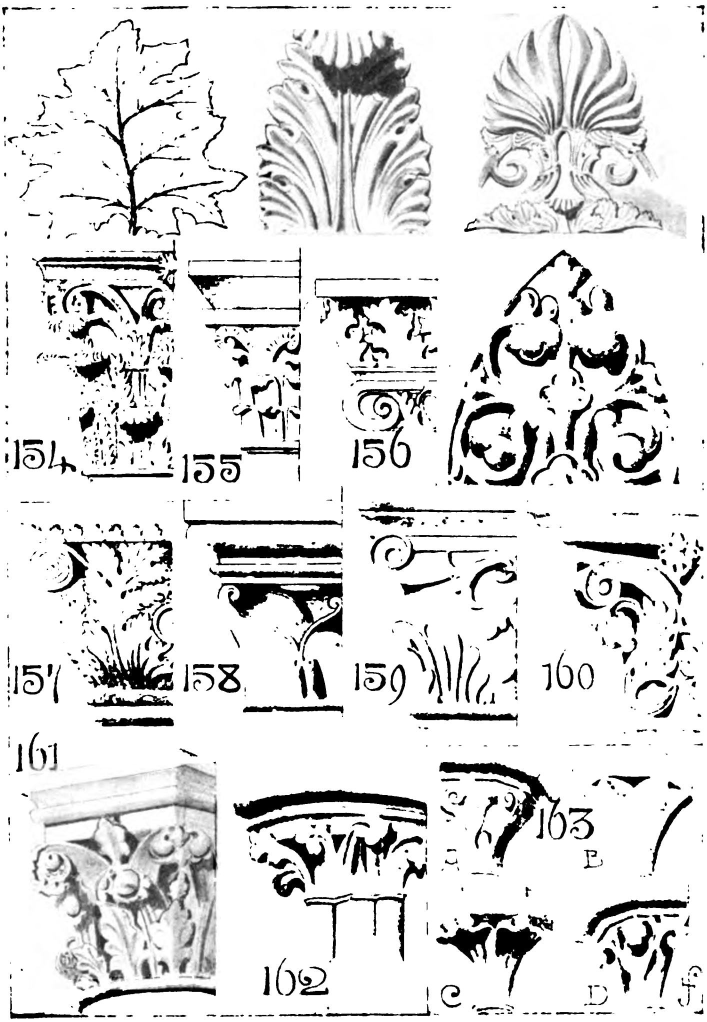
available for the execution of architectural decoration, and which must be such as will be permanent and enduring, and for exterior work also such as will stand wind and weather, nothing like a satisfactory direct imitation of nature is possible, in the same way as it is with the painter's more manageable materials. Stone carving at the best can never imitate nature's vegetation; if it attempts that, it can but produce a coarse reminiscence; whereas the imitation of the principle of growth, the devising of a new design of our own, carrying out in our own way a suggestion from nature, is within our power. Thirdly, it is essential that architectural ornament should be in harmony with and appear a part of the architecture; and the forms of nature, if used in an attempt at direct imitation, do not seem to belong to the world of architecture, which is a highly artificialised art; they must be architecturalised, if one may coin a word, to bring them into harmony with the building, and render them æsthetically a portion of it.

Hence it arises that in architectural ornament founded on nature we take refuge in conventional treatment of natural forms, taking the natural form as a basis or idea, and transforming it into architectural decoration in an arbitrarily chosen manner. No better example of this could be found than in the Greek treatment of the acanthus leaf, which has been so successful indeed that it has placed its mark on architectural foliage ornament ever since. The sketch of the natural leaf and the conventionalised one side by side (Fig. 151, Plate III.)* shows better than any mere words what is meant by conventional treatment of nature in ornament. The leaf is a serrated one with deep indentations, but not regular in form. The Greek takes the fact of serration and indentation, but reduces these to an architectural

* The remainder of the numbered illustrations referred to in this chapter will be found in the separate plates.

symmetry. The natural leaf is thin; the Greek makes no attempt to give any corresponding appearance of tenuity to his leaf; it is a marble leaf form constituting a portion of architectural decoration—an architectural leaf; it has no occasion to simulate (which it could not in any case successfully do) the frail character of the real leaf. The leaf has a central rib with minor ribs or ridges radiating from it; this is an essential constituent of the design of the leaf, just as much as the indentations, and it is duly preserved in the architectural leaf, but in a symmetrical and conventionalised manner. The same principle is seen in the Greek ornament shown in Fig. 152. Here we have the natural system of the growth of petals from a central stem, but more highly systematised, so as to harmonise it with the architecture; the form used is said to be, and might be, derived from the honeysuckle, but it is not allowed to retain any direct resemblance to the flower. Fig. 153, which is a piece of Gothic foliage from Wells Cathedral (on a much larger scale than the Greek example), is interesting for comparison as exhibiting, in a different style of work, exactly the same idea of a conventional growth founded on natural growth; the leaf showing some of the main characteristics of a leaf, but thickened and solidified into a fitness for architectural service; the growth from a central stem again is retained as the idea, but treated with architectural symmetry. The one ornament is in marble, the other in stone; they are the work of men as remote from each other in time and place as in social and mental habits of life; but they are both first-rate examples of ornament, and different as they are, they both illustrate the same idea of the relation of decorative forms to natural suggestions.

The acanthus leaf forms, as has already been seen, the principal decorative detail of the classic Corinthian capital (Fig.



EXAMPLES OF CAPITALS AND ORNAMENT.

154), and its influence may be traced throughout many variations on this form of capital which have been made in Byzantine, Romanesque, and early Gothic work, the latter especially in France; as well as in further variations made in the time of the Renaissance. It is perhaps difficult to say why the capital of the column should have been selected especially as a position for the employment of decorative foliage in the first instance. Probably at the time the Corinthian capital was developed it was found that ornamental leafage afforded a convenient means of masking the awkwardness of the transition from the round shaft to the square abacus, and these forms having been used in that position with such admirable effect by the Greeks, and by the Romans working under Greek influence, became accepted as the happiest method of treating that portion of the design, succeeding generations having tacitly confessed their inability to improve upon it: for the quasi-classic capitals of the early Gothic period, though variations from, can hardly be considered as improvements on the classic capital, and the finest and most characteristic Gothic capitals depart from it so completely that they may be said to belong to another type. Foliage forms have, however, this special suitability for the capital, that they convey naturally an idea of upward springing and spreading of the line of the column, which is very suitable at the capital; otherwise, there seems no special reason why foliage forms should not also have been employed at the transition from the base to the shaft, as well as from the shaft to the capital. In Byzantine and Romanesque work they are, in fact, partially so employed, in order to cover and fill in the angle spaces of a square base on which the circular base-mould of the column is set. In regard to the classic capital, there has been a want of enterprise and originality shown in its modern treatment; it has been accepted and copied almost slavishly, an ancient

example being simply imitated over and over again; whereas it might certainly have been possible to evolve some new treatment of it; to retain its highly conventionalised and architectural style, but to conventionalise some other leaf than the acanthus; and there is still, I think, something new to be done with it in that way, if people would take the trouble to fairly try, instead of adopting the easier method of copying. Nor need it be a rigid rule that all capitals in a building of classic style should be precise repetitions of each other. It would be possible to give new interest to the detail of a columnar building by treating the capitals with similar general outline and form but with differences of detail; an effect of which Gothic buildings afford numberless examples, but which, as far as I know, has yet to be tried in modern classic work. Of course the classic type of capital is too severely designed a form to bear the amount of variation which we see in Gothic capitals (even in the same building), but it may bear a certain amount of modification without losing its main characteristics, and would gain in interest thereby.

During the transition from classicism to mediævalism, however, we meet with a good many examples which have the appearance of experimenting with the capital, though some of these may be considered rather as corruptions of than improvements on the original form. In the Byzantine example, Fig. 155, we have the general form of the classic capital with the acanthus leaf left uncut on the edges, which can hardly be called an improvement, and seems more due to a desire to save trouble than anything else. On the abacus of this capital is placed a block with a fillet and a bevelled under-side, which looks like a renewal of the Roman fallacy of placing a slice of the architrave on the top of the capital, but the Byzantine architects have left out (to their credit) the now useless archi-

trave, frieze, and most of the cornice, leaving only what looks like a clumsy form of the crown moulding of the latter. Fig. 156 shows another curious but very illogical experiment, in which a kind of reminiscence of the Corinthian capital is placed over a nearly orthodox Ionic capital. Fig. 157 is another very characteristic Byzantine form, in which the bell of the capital is convex instead of concave,* and the abacus and necking are treated with floral ornament of their own. The decoration of the necking in this way seems a mistake; it weakens the feature and does not separate it sufficiently from the foliage of the capital. The peculiar form of angle scroll of this capital should be noticed. This is one of the numerous variations played upon the scroll or volute which first became a recognised feature in the Corinthian capital, and which was introduced to give support to the angle of the abacus. This angle scroll has been one of the playthings of architecture ever since. For a considerable period in early Gothic architecture it was reversed and turned inwards towards the body of the capital, as shown in the early Gothic capital (Fig. 158). There are Italian Renaissance examples showing a similar treatment in a more classic form of capital (Fig. 159). This is what happens when one feature is invented, in a fortunate moment, which is seen to be a really good and useful one; it lays hold of architecture, and refuses to let go its hold however it is twisted about and disfigured. The early Gothic architects in France used the scroll for a long time on the angles of their capitals, as in Fig. 160, in variously modified forms, long after the resemblance to the foliage of the classic capital had disappeared. Then a leaf was rolled round under the angle of the French capital to take the place

* This convex Byzantine capital became the parent of a whole tribe of capitals in early French Gothic, and thence in Norman and English work.

of the volute (Fig. 161), and this angle leaf, solid and heavy in substance, became the characteristic form of foliage of the Early English Gothic capital, as shown in Fig. 162, a typical example from a Lincolnshire church, but which probably had its first origin in France. That is a form so different from the classic capital that the historical relation between them would hardly be suspected if we had not such a large train of intermediate examples in existence to illustrate it; and, what is more important to our main argument, the relation of the design to natural forms is very nearly the same as in Greek ornament. It is true that the capital, in its general design, partakes of the irregularity of nature, and makes no attempt at the symmetrical arrangement of Greek ornament; but otherwise it is no more an imitation of nature than the Corinthian capital, its forms being conventionalised suggestions or reminiscences of natural growths, only in a manner specially suited for execution in stone, just as the finer Greek forms in Figs. 152 and 154 are specially suited for execution in marble.

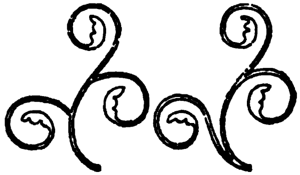
The phase of experiment through which this development of the Gothic capital from the Classic passed is curiously illustrated in the four small capitals shown in Fig. 163, which are all close to each other in a wall arcade just inside the west door of Peterborough Cathedral. These must all have been worked at the same time, and they look like the deliberate trying of experiments with different forms of capital. That marked D is nearly the type of capital shown in Fig. 162, except that the lines of the leaf stems are straighter and more abrupt; they have not acquired the life-like curves of the later example, in which the leaf forms seem as if the bell of the capital, like Aaron's rod, had budded from an inherent impulse. Later in the Gothic style the foliage lost this appearance of springing inevitably out of the bell of the capital, and assumed the aspect

VARIOUS EXAMPLES OF ORNAMENT.

of being bound round it independently, with very inferior architectural effect.

Next to the capital with its acanthus or other leaf, perhaps the most important element in natural ornament has been the scroll. The scroll indeed is not itself a natural but an abstract form; but the arrangement of natural ornament on the scroll line enables us to carry it on with an appearance of growth and freedom, and with an effective contrast to the horizontal lines of the building. The first and most essential quality in a scroll design is that its curves should be cleanly drawn and designed, and that every curve should, at its springing or junction, be a tangent to the line from which it springs.* No amount of richness and effectiveness in leafage detail will atone for any initial defect in the curvature of the lines: and this is why the Roman scroll ornament, rich and broad in detail as it often is, nearly always looks common and awkward in comparison with Greek scroll design (Fig. 164, Plate IV.). In Roman work the scroll is often not sufficiently conventionalised and geometrised; it is left to assume something of the accidental breaking and irregularity of line which a real branch might assume if bent into a scroll form (Fig. 165); and this fatal error destroys its essential beauty, and reduces it to a kind of cabbage-garden ornament. In Greek work the scroll is drawn with geometrical precision and in clean sharp lines, as shown in Fig. 164; and in any cases where leafage forms a more important portion of the scroll than this, the precision of the curve and the clean character of the lines is never lost. The same tendency to severe line may be seen in

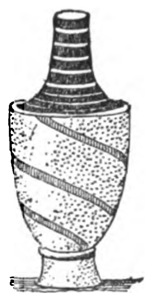
* That is to say, a subsidiary curve must not butt against or spring at an angle from the main curve; at the point of springing both must be identical in curvature, each being a continuation without a break of the main curve preceding the point of separation, but a continuation on different lines.



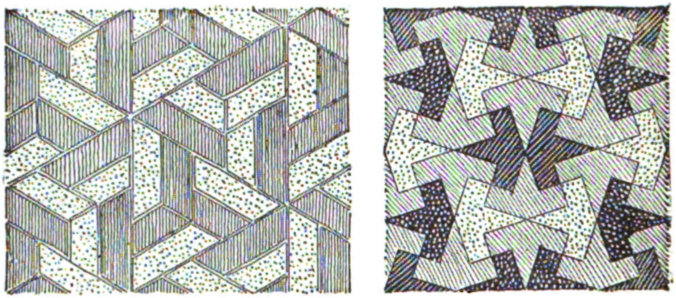
WRONG. RIGHT.

the Indian example (Fig. 166), which, like a good deal of work found in India, shows manifest traces of Greek influence. In the best period of Gothic work (as in Fig. 167), the clean character of the curve is also preserved, as well as in the best Italian Renaissance ornament (Fig. 168). When we come to late English Renaissance, we often find, as in Roman work, broken and crippled curves, and straggling and ragged festoons of flowers, doing duty as "ornament" (Fig. 169); and in the later French Renaissance of Louis XIV. date, so far has the true idea of scroll design been lost sight of, that we find one of the main features of Louis Quatorze and Louis Quinze ornament consists in the introduction of a number of short portions of scrolls which only touch each other on the convex of their curves (Fig. 170), and which have lost all appearance of unity or continuity of design, and form merely a bundle of patchwork unworthy of the name of ornament. Architecture at her best will have nothing to say to these crippled and ungeometrical curves; they are not ornament, but only bungling. A curious instance of the defect arising from bad drawing of curves is shown in an example of Indian ornament in low relief (Fig. 171), from a square pillar in the Indian Museum at South Kensington. This is an odd mixture of conventionalism and naturalism. The separate flowers are conventional, and very well treated; the lines of the stems are only partially conventional, and are laid out in badly designed curves, neither natural nor geometrical, but with a kind of pretence of being either or both. Hence what might have been a good piece of ornament has been spoiled. Curves are exacting things; they demand respectful treatment; if laid out at all as a portion of ornamental design, of which they form a most effective element, they must be laid out truly and geometrically, and if neglected in this respect they will amply revenge themselves on the designer,

But architectural ornament has to be considered not only in itself, but in relation to the building as a whole. When we regard ornament in this relative sense we shall see that it may be considered under two heads, *surface* ornament and *functional* ornament: the former being that which is employed merely to cover a surface which would otherwise be a bare space, and give it more interest; the latter being employed to give an emphasis to some portion of the building which has a special function in the design. Thus the capital, Classic or Gothic, is functional ornament; so is the ornament frequently introduced into one or more of the arch mouldings in Gothic architecture. We find this use of ornament illustrated equally well in other objects besides architectural ones; for instance, we may take as an example an Egyptian bottle, which is seen in one of the wall paintings in the British Museum, in which the body is a terra-cotta brown with a thin green spiral line round it, and the neck is white with black rings. Here there is functional ornament distinguishing the neck of the bottle from the body; a very early example of a method of using ornament to give special expression, which has been used in a thousand different ways since. Surface ornament may be and often is derived from the arrangement of constructional materials; for instance, here are some examples appended of Saracenic ornament (see page 162); one derived simply from the interlocking arrangement of bricks of a certain shape and of two different colours; another formed by the arrangement of tiles of four colours, which must be arranged on some system, and may therefore as well be arranged in a decorative manner. Then again surface ornament may be derived also from geometrical or from natural forms, arranged so as to form a continuous



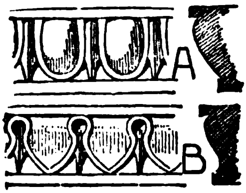
device or *diaper* over a surface, without in any way affecting the architectural expression or design, but merely giving some-



·BRICK PAVEMENT TILE PAVEMENT

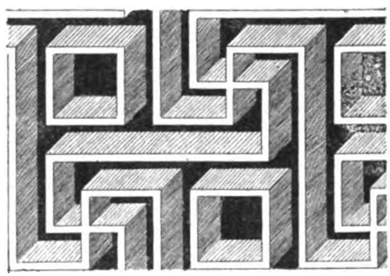
thing to take the eye and to break up the surface, where otherwise it would be a blank. For this use of ornament simple forms which are effective by repetition are the best; it is not worth while to expend forms of higher elaboration merely on the filling up of blank spaces, unless the spaces are such as to furnish an opportunity for painting in the intellectual sense, and that is another art; not a part of architecture, but a separate art to which architecture is the framework.

There is some relation to be observed between the nature of the ornament and that of the surface on which it is executed. For instance, in the functional ornament which often decorated the separate mouldings of the Greek cornice, there was generally some relation or resemblance between the leading lines of the ornament and the section of the surface on which it is executed. Thus the form of the "egg-and-tongue" ornament shown at A in the annexed cut would be carved on a convex section resembling the outline of the egg, while the form at B, where the outline takes the



form of a reflex curve, would also be of a reflex curve in section ; and thus consistency of character and effect is maintained. The Greek fret or key-pattern again, to which we have referred, is never in any one instance that I know of executed except on a flat surface, with which alone it is in accord; on any curved surface its severe square lines would be out of keeping with the position, and would suffer a distortion which would interfere with the essential character of the ornament.

Another thing to be noted in regard to surface ornament is that it must never in any case be so designed as to conceal or contradict the nature of the surface on which it is placed. As an example of what is meant, a drawing of a Roman mosaic pavement is subjoined, in which the pattern, a variety of the Greek fret, is made, by dint of shading and a perspective arrangement of the lines, to appear as if the bars composing the pattern were



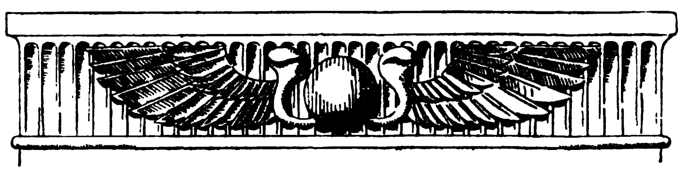
standing up on their edges, thus giving the floor, which is really a flat surface intended for walking on, the appearance of a kind of gridiron. This is a flagrant example of bad taste; but blunders of the same kind, though not often so bad as this, are not infrequent in wall and floor decorations.

In ornament derived from nature, whether functional or superficial, it is exceedingly important that consistency of style should be preserved, especially in regard to the degree of approach to nature which is admitted. In this latter respect a great deal of the ornament of the school of the Adams, which has come so much into fashion lately, is exceedingly faulty; it is not uncommon to find combinations in which there is a

scroll, perhaps, of conventional acanthus leaves, with a spray of purely naturalistic foliage springing from it (as in Fig. 169); a mingling of contrary *motifs* which is absolutely at variance with any idea of style at all. Still worse is the mingling of natural forms with artificial ones, of which there has been too much in Renaissance as well as in modern French work; and worst of all, perhaps, the fabrication of ornament by the imitation of artificial objects alone. This is, wherever and however it is done, the worst and most vulgar form of architectural ornament; there are degrees of badness in it, no doubt; it may consist of artificial objects rather effectively grouped into a kind of decorative bundle, as is the case in some French work and in some of the ornament of the school in which Grinling Gibbons was prominent; or it may be, as in a well-known Roman frieze, a mere collocation of utensils carved without even the pretence of arranging them in a semi-decorative manner; which is about the lowest barbarism to which architectural ornament can descend.

The question has been discussed sometimes, how far ornament can express any meaning or sentiment. As a general rule I think it may be said that it can rarely do this without at the same time ceasing to be ornament in the true sense at all; ornament being essentially something created for the sake of beauty. There has been a certain practical meaning in some imitative ornament, as in the ox-head (or skull), and wreaths and pateræ between, which used to be sculptured often on the frieze of a Roman temple (Fig. 172), and which symbolised the sacrifices which went on within the temple. This has been imitated in modern architecture without any excuse or meaning at all, these objects not having the same signification for us; the real parallel would be if we sculptured the exterior of a law-court with bas-reliefs of judges' wigs with gowns

festooned between them, or the exterior of a hospital with an alternating ornament of bottles and bandages; we should then be doing the same thing that the Romans did with their ox-head and garland friezes. There have occasionally been fairly successful attempts at giving a half-symbolical meaning to architectural ornament; M. Garnier has done this, for instance, in some of the capitals in the Paris Opera House; in one (Fig. 173) the centre of the capital is occupied by a very conventional suggestion of a lyre, which spreads out at each side into members which distantly suggest wings; it is very cleverly done; there is no imitation, but just the hint given to the mind of an idea; but it is only when done in this delicate and reticent manner that such treatment can be a success. This reminds one of that famous Egyptian



example, the winged globe, which is a grand suggestion no doubt, but in the way it is generally used in Egyptian architecture it is perhaps more properly to be termed a symbol than an ornament.

Apart from the decorative detail which forms an integral portion of the building, there is a separate class of what may be called *applied decoration*, consisting of work which is not built up with the building, but attached to its surfaces afterwards. Of these forms of decoration the most important and valuable, perhaps, and the most distinctly architectural in character, is mosaic. I call it especially architectural because, being formed by the collocation of innumerable small pieces (Fig. 174), there

is a kind of character of miniature masonry about it which assimilates it with the main building. Mosaic cannot be used in positions too near the eye, as a certain distance is required to blend the cubes of which it is composed together, and it is best put together and has the best effect on a concave surface, where it gets varied lights upon it, though it can be used with effect on a flat wall and (of course) on a floor. It is rarely used on convex surfaces, owing partly to the greater difficulty of fixing it in such a position, though it can be done; and mosaic has even been used in ancient, though not in modern, architecture, as a decorative covering to the cylindrical surface of a column, a treatment of which Mr. Poynter has given a representation in his picture, "Diadumene." Marble inlay, a beautiful system of decoration, is a kind of mosaic on a larger scale, put in with larger pieces, and most suitable for a flat surface, though it has been sometimes employed with effect in such positions as the soffits of arches. A method of forming mural pictures of a very permanent kind by an inlay of coloured marbles, in large masses, was invented by Baron Triqueti, and some examples are (or were) to be seen at University College, London; it has a good effect, and is a form of permanent and durable decoration which perhaps merited more attention than it has received. Tiles form another branch of applied decoration, differing from mosaic in this, that each tile is susceptible of bearing a distinct separate design, which may either be complete in itself and form a repetition pattern by the juxtaposition of the tiles, or may be so arranged that several tiles may work together into a larger repeating pattern. Another form of applied decoration which was a good deal used in Italy in the Renaissance period, and to which attention has lately been directed in this country, is *sgraffito,* which is formed by laying

a coat of (generally) black plaster of the usual thickness (but any fairly dark tint will do), and laying on this a very thin coat of white plaster, in which, while still soft, a design is drawn by removing the white plaster in parts, either from the design or from the interspaces, as may be preferred. Any two colours may be used, instead of black and white, provided they are sufficiently contrasted; but black and white produce the most effective result.

Film removed from the design, leaving it in black.

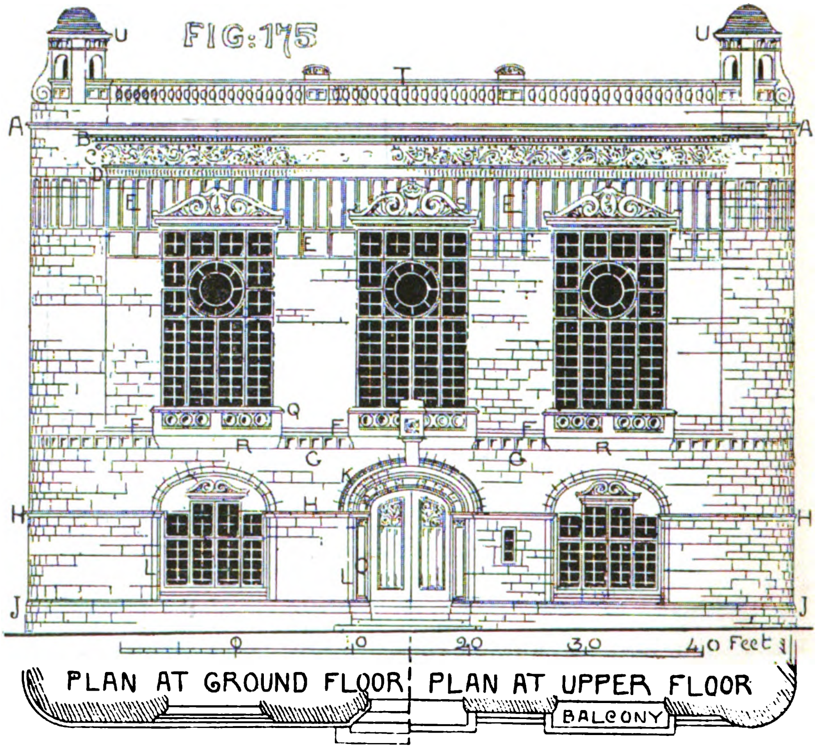
Film removed from the spaces, leaving the design in white.

PANELS IN SGRAFFITO.

It may be of some interest to give an idea of the manner in which the details of a building are drawn out for the guidance of the workmen, and also to enable the architect to study the different details on a larger scale than the general elevations can show them. For this purpose we will take the front shown in the sketch in Fig. 13 (Plate I.), and in the first place make a geometrical drawing of it to scale (Fig. 175). This (for the sake of space) is a smaller scale than is usually employed for general elevations, though this scale would suffice if a few measurements between the principal points were added (such as the complete

width of front, distance between centres of windows, width of windows and of piers between them, etc.); but twice this scale, which would be about what is usual (8 feet to an inch), would bring us no nearer to an intelligible working-out of the details. The method is to draw out the separate details on a large scale,

FIG: 175



generally full size; mouldings invariably full size. It would be impossible to do this here, but a sheet is appended of the principal details drawn out one-twentieth the size of execution, which will be sufficient here to explain the *modus operandi.* The reference letters on the detail sheet show the enlarged scale of

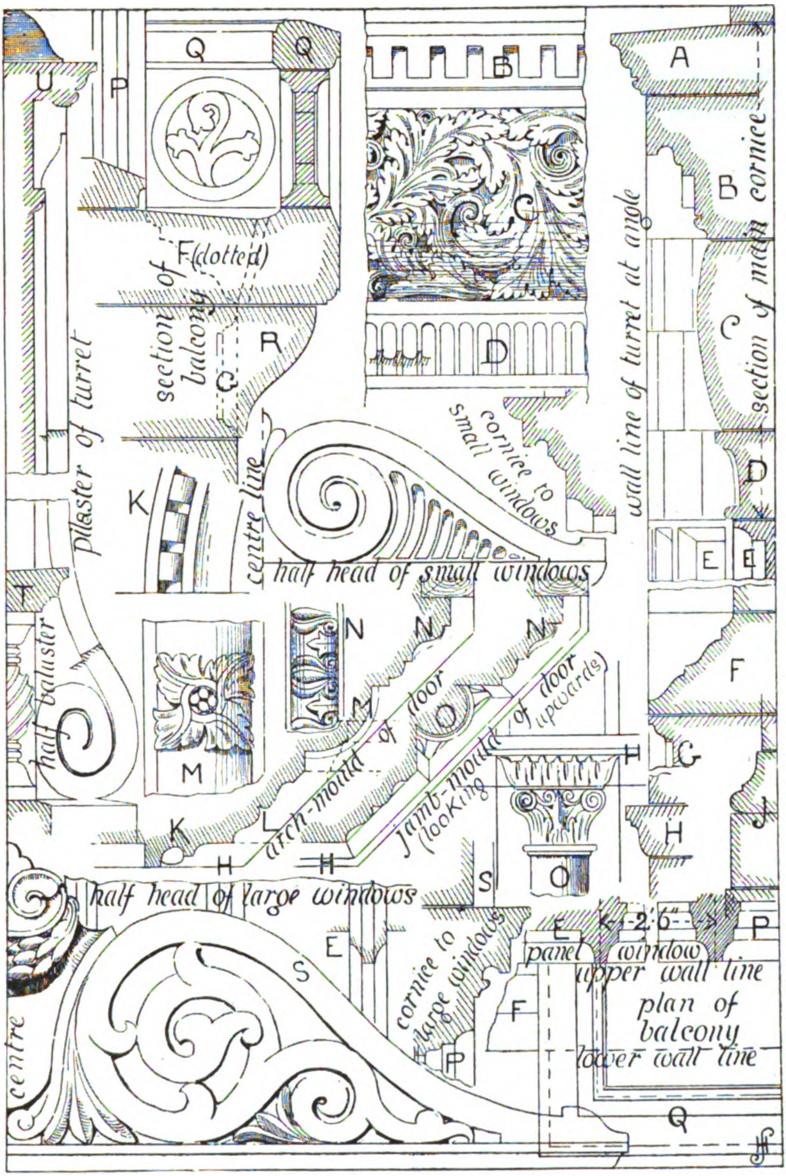


Fig. 176: details of Fig. 175, one-twentieth actual size.

the details which are marked by the same letters in the general elevation; and on the detail sheet the same detail is marked by the same letter wherever it occurs, whether in section, elevation, or plan. The first thing is to get the profiles of the mouldings. The section of the main cornice is shown at A, B, C, D. This is not the ordinary type of cornice, it is a kind of reminiscence of the classic entablature, A B taking the place of the ordinary cornice, C that of the frieze, and D that of the architrave; and B is of much less projection than the classic cornice which it imitates, because it is intended to die into the face of the turret worked out of the angle of the building, instead of going round the angle (see the general elevation); the only portion which goes right round being the upper moulding A: on the detail the outer wall-line of the turret is shown, to render this clear. The ornaments at B, C, and D in the cornice are shown in elevation, marked by the same letters; the exact depth of the flutings at D is shown by the little profile section sketched on them. As to the band of carved ornament at C, unless the architect wished to make it one complete design, starting from a centre and carried out symmetrically to the two ends (which is not implied here), the probable course would be to sketch six or eight feet length of it full size, and hand it over to a clever carver to continue it in the same style, allowing him a little liberty in working it out, in which case he will put all the more life into it. To return to the sections of mouldings: beneath D is shown the sinking and moulding of the wall-panelling E, below which is plain work till we come to the set-off moulding F, by which the transition from the thinner upper wall to the thicker lower one is made. The moulding of the smaller square panels, G, is shown below that; then comes the section of the string-course H, at the impost level of the ground-floor windows, and then the base-mould J. Then we have the section through the arch-moulding of the doorway,

the ornaments at K, M, and N, being drawn separately; and the section of the mouldings of the door below the arch, given as seen looking *upwards*, to show the projection of the string-course H, and the manner in which the cap of the shaft O is worked into it; the cap is given separately in elevation. The first-floor windows have stone balconies: the section of the balcony with its moulded capping (Q), and the supporting bracket R, is given in the upper left-hand corner of the sheet, the set-off moulding F being dotted behind it to show where it abuts against the end of the balcony; and the size of the small panels G, which come between the brackets R, is dotted also behind the section of R. The end circular panel of the balcony, with its perforated ornament, is seen in elevation. The plan of the balcony is shown in the lower right-hand corner, where the details shown in section before are seen on plan, and also the mouldings of the jamb and mullions of the large windows, and the distance from centre to centre of the mullions (2 ft. 6 in.). At S is shown half the ornamental head of the centre window (the other half being the same reveised), resting on the top line of the window cornice; the section of the cornice is shown just above, and on the top of the cornice section the vertical line marked S shows what is the projection or thickness of the ornamental head from the wall-face. The head and cornice of the ground-floor windows is similarly shown in the centre of the sheet. On the left is given the capping of the balustrade (T) and half the baluster, the crown-moulding (V) and brackets of the small turrets, and the pilaster ending at the foot in a scroll, and against which the balustrade (T) is stopped at the end.

Supposing these details were all full size, we should now have nearly all that is required to build this front—what we should require further would be a plan of the small turrets above the balustrade; a drawing to show the spacing of the balusters

—a delicate matter of effect which it would never do to leave to the mason; the detail of the small piers in the centre of the balustrade; a detail of the ornamental head of the side windows (as they differ from the centre one); the separate pierced panels of the balconies, which ought to vary in design; the bracket over the door intended to carry a statue (omitted in the elevation, as that is no part of the builder's business); a plan of the jamb of the door looking *downward*, to give the base of the shaft and the treatment of the plinth moulding in regard to it; and the mouldings and carved panels of the entrance doors. The wall-panelling below the cornice is provided for, as we have figured the width between centres of the window-mullions, and the panelling above has to be exactly half of that; but the half plan of all that panelling and of the mullions and jamb of the upper windows would have to be set out on a long board full size, by the foreman or clerk of works, to ensure accuracy in the masonry. The position of the transoms of the large windows is sufficiently fixed by the central circle, just the width of two lights, to which the transoms must be worked. Details like the ornamental window-heads might be drawn half size, but it is safer to do them full size; it is wonderful what a different appearance a detail assumes when you double its size!

The amount of detail drawing required for carrying out this small and simple front—the external face only of one side of the building—may give the reader some idea of the extent of work involved in studying and preparing all the details, external and internal, for a building on a large scale and of elaborate architectural design.

CHAPTER VI.

ARCHITECTURE IN RELATION TO CITIES AND LANDSCAPE.

WE have hitherto been considering architecture as the designing and decorating of a building regarded by itself, and apart from its surroundings; and for a mere ideal design on paper this may be very well. But no true architect would ever elaborate a design for an actual building without consideration of its relation to the scene in which it was to form an element, whether in regard to surrounding buildings, if in a city, or in regard to the contour and character of the landscape, if the site of the building were in open country.

To take first the architectural effects of cities. There are two great distinctions between ancient and modern cities, architecturally considered. First, the ancient practice of building a city within definitely marked boundary walls has been discontinued, and the city, as such, has lost its unity and defined character; it is now no more than a tract of land irregularly covered with buildings. Consequently the chance of actually designing a city for effect, planning it as a whole from the beginning, is never to be thought of now. Wren had a chance after the burning of London, but the authorities were too much for him. There is no doubt, however, that the deliberate laying out of a large city as an architectural design might

result in some splendid architectural effects. Take as an instance Liverpool, which has climbed and extended itself irregularly and piecemeal along the floor and up the sides of a theatre of gently sloping hills, with the estuary of the Mersey occupying the chord of the arc. If this city could be begun again, and built in semicircular terraces height above height up the sides of the "theatre," it would be, or might be made, one of the most magnificent architectural spectacles, from the river, that has ever been seen. It is probable that some effect of this kind was realised in such cities as ancient Babylon; but such effects belong essentially to despotism. In a modern town there are too many independent interests to be consulted, and such unity of design is impossible. Bath, however, may be named as an example of a city in which a considerable portion was planned and laid out for effect under the direction of one architect, Wood, and with the result that it is one of the most dignified and stately cities of second-rate dimensions; owing, of course, something to its beautiful site. In Edinburgh it may be said that the site has done everything and the architects next to nothing; there are few really good buildings there, and they do not much affect the general aspect of the city; the advantages of site, for picturesque effect, being such that the worst architecture could hardly have spoiled it, though the finest might add something to it. The other modern distinction is that whereas evidently the ancient routes of streets were mostly determined either by the configuration of the site or by existing landmarks of property, in modern days we lay out the new streets according to deliberate forethought. If we cannot lay out a whole town according to a set plan, we can and do lay out its new streets deliberately, and one result of this is that whereas the old streets had generally curved lines, the modern ones are nearly all straight;

a matter which has given rise to much criticism of late. It has been rather too hastily assumed that all streets look better if curved or winding. All streets which are composed, as the great majority are, of buildings of varying height and design, are better so, no doubt; but where it is an object to produce an effect of palatial stateliness, streets running in a straight line, and with buildings symmetrically designed on a preconceived scheme, have their value in the effects of a town. It is a treatment monotonous, no doubt, for general use, as Harley Street and Cromwell Road testify too well; but when used in moderation, and in connection with buildings of a sumptuous and stately character (for that is imperative), it is capable of very fine effect. In streets of irregular buildings it is argued (by utilitarian people) that there would be something absurd in deliberately laying out a new street on irregular lines for the sake of effect. So long as it is not done to the extent of injuring the convenience of the buildings, I do not see that it is more absurd than laying out garden walks in curves for effect, which is done every day. There are, however, two limitations to be observed. If a street is laid out on a curved line purely for the sake of effect, it should be a symmetrical curve, a part of a formal design, and not a pretence of being an accidental irregularity. That kind of attempt to construct a picturesque irregularity, of set purpose, always fails, because it always betrays itself. Any effect which is artificially designed, should appear so, and not attempt to look as if it were a happy accident; and the curve should be laid out, if possible, in direct relation to some architectural point which it may either encircle or lead up to, as a centre or a climax. The other limitation is, that the curves should be of large radius; the planning of streets and dwelling-houses on curves of small radius is both inconvenient and insanitary. It checks the

direct circulation of air in the street; it introduces inconvenient shapes for the interior of rooms; and the concave side of the curve in each row of dwellings is liable, in hot, still weather, to include a pool of stagnant air. A large "crescent" has a fine effect in a suitable situation; but it should be the segment only of a curve of large radius, and never a complete semicircle.

The question of straight or crooked depends a little on what you have got to see at the end of your street. If you have a great building or monument to close a straight vista, then you had better have the vista. This subject of centralising buildings and streets and squares on an axis, so as to seem part of a thought-out design, is made a good deal of in France, and much neglected in England. It has even been urged, by some of those who think most about the subject, that this centralising is a vanity and a fallacy. It is said that St. Paul's, for instance, has a finer effect from standing askew to the top of Ludgate Hill, than it would have if it faced Ludgate Hill centrally. I am inclined to think so too, but that is because Ludgate Hill is only —Ludgate Hill. If it were a broad avenue of stately columnar buildings of similar type to St. Paul's architecture, perhaps combined with an avenue of trees, I think we should want St. Paul's to face it centrally. Take the case of St. Peter's, with its artificially planned colonnades and fountains symmetrically arranged in front of the façade; you could not possibly propose in that case to set the building obliquely to the *place* in front of it. But as, in the case of St. Paul's, we have only a narrow street of miscellaneous shops leading to it, that is *infra dig.*, and it was better the cathedral should ignore it. The one is the architectural effect, the other the picturesque. It can hardly be said, perhaps, that the one is better than the other; they are different, and you cannot have both together; you must have one or the other. In London we are always just missing the

architectural treatment, by carelessness or blundering, without getting the picturesque one. Thus we put the Albert Memorial just nearly enough on the axis of the Albert Hall to look as if it was meant to be centralised, but had been set out wrong. We have made Constitution Hill a straight vista with a monumental arch at the end, as if it formed a piece of symmetrical architectural planning, and when we come out at the arch, we find it cuts into the shoulder of an irregular curve and faces nowhere. Now the fact is that in the most important squares and streets of a large city, especially of a capital, symmetrical laying out and centralising of the principal streets and open spaces and buildings is quite in place; it is an element of stateliness which is proper to such a situation, and the importance and value of which has been much underrated by modern critics.

Of course one cannot overlook, in this connection, the curious fact of the total disregard of symmetry which the Athenians showed in the placing of their very symmetrical buildings in and about the Acropolis, even building the small Niké Temple by the gate slightly crooked to the gate. This proves that they were indifferent as to the symmetrical relation of their buildings, in this case at least, and that they did not regard the Acropolis architecture as a whole, but as so many independent buildings placed where they were most convenient. But it does not follow that there was a calculated effort, on principle, to avoid symmetry in placing the temples; and the recent studies of Mr. Norman Lockyer and Mr. Penrose in regard to the orientation of Egyptian and Greek temples have shown that it is highly probable that the angles of these temples were determined in relation to the rising or setting of certain conspicuous stars; thus substituting a celestial for a terrestrial symmetry.

The combination of foliage with architecture in cities is a source of beautiful effect. Edinburgh offers a fine example

of this, in the effect of the high buildings on the Old Town side, as seen from Princes Street, rising above the trees on the sides of the hill; and much of the charm of Paris consists in its frequent combinations of stately and symmetrical architecture with foliage. In London we may remark the picturesque effect of the Foreign Offices as seen from the suspension bridge over St. James's Park water, rising over the mass of trees, with the water in the foreground: a London picture which would be worth painting. It is worth while, also, to keep an eye on vistas into the surrounding country from the city. At the end of one of the longest, straightest, and dullest streets in London, for instance, which cockneys call "Gow-er" Street, but which is properly pronounced *Gore* Street, there is to be seen on a certain number of days in the year, more or less (according to the state of the London atmosphere), a vision of a distant hill, like the Delectable Mountains in the "Pilgrim's Progress," filling up the space between the two rows of houses with its faint distant green and purplish tones. This is Hampstead Hill, which (though few people in London know it) stands at its highest point just on the line of Gower Street, and sends a glimmer of nature down the street. One would be sorry to see even the best new building block out such an incident. Of similar value, in a rather different way, would be the opening a view of the Mall and the trees into Charing Cross, if Commissioners of Works ever allow us to have it done. Among combinations of street architecture with natural scenery, perhaps few instances are finer than that of the main street of Innsbruck, with the mountain side filling up the view, and the monumental column in the centre of the street relieved against it. As a noteworthy piece of architectural scenery in a city, may be named one splendid effect in

London, very little known, viz., the view of the Victoria Tower from what is called the Little Cloister at Westminster. As an architectural picture, this view of the great tower, seen looking up from the confined little cloister yard with its prim arcade and railings for the foreground, is really sublime, and ought to be put on record by some artist of genius, before it is too late.

In the general view of a city as a whole, no architectural form is so fine and impressive as a large dome, as all views of Rome, Florence, and London (not to mention other examples) will attest. A dome has more massive and monumental character, and has more effect as giving nobility of architectural character to a city, than even a lofty tower, though the latter is the next finest feature that a city can have; to give the full value to a tower, however, it is desirable that it should be contrasted with comparatively low and level buildings. The Campanile at Venice may be named as very effectively placed in this respect. The clock tower at Westminster, a fine and characteristic tower in itself, loses much of its effect from immediate contiguity with buildings which are both rather too high for it, and which have a strongly marked vertical tendency in their lines: this is seen especially in the view of Westminster Palace from the opposite side of the river, where the clock tower would contrast very effectively with the level lines of Westminster Bridge, but the pavilion at that end of the river front, coming close up to the tower from this point of view, almost entirely nullifies the effect of its real height. A curious illustration of the same kind is furnished by the different effect of "Cleopatra's Needle" as seen looking along the Thames Embankment, where its height tells very effectively, and as seen looking from the Adelphi, where it is brought into competition

with the shot-tower on the other side of the river, which nearly neutralises its effect.

As has been observed, we in the present day never have any opportunity of carrying out what would be the grandest form of architectural design that could be undertaken—the designing of a whole city so as to give the greatest effect of climax to its larger buildings, the finest combination of convenience with picturesqueness in its streets. But this desire for architectural effect in the disposition and grouping of buildings is never entirely dormant. In the life of every city there occurs from time to time a crisis in its development; a time when the old buildings are found deficient and are to be rebuilt on a grander scale, or when this or that quarter of the city is too crowded, and a new street is to be opened out; occasions when there is usually some attempt, or at least the pretext of an attempt, to take the opportunity of getting a new and finer effect of architectural combination. In England the mischief is that these opportunities are either neglected or taken in hand in a faint-hearted, half-and-half manner, and, if we may judge from the results, by persons who either do not care about or do not understand the matter. London is in itself a whole history of lost and wasted opportunities in this respect; in many cases arising from a poor and short-sighted spirit of economy.

We will spend no proportionate sums over our great buildings. When money is asked for such a building as a War Office, instead of there being any desire to do it in a way worthy of a great country, and such as would be a delight and pride to future generations, the cry in Parliament is nothing but economy, economy! and the thing is to be patched up in the cheapest way it can be done, and with no regard to architectural grandeur; while a little kingdom like Belgium,

as if to shame us, has spent about a million on Law Courts for the sake of doing a grand thing, and produced a building which is one of the architectural achievements of the age. This growing indifference and, I should venture to say, stupidity about the architectural treatment of a great city, is a sign possibly of something more than architectural indifference: it is an indifference to the greatness and honour of the country. Periods of great architecture have usually been periods of great national aspiration of one kind or another; and when a nation is indifferent to its public architecture, it is only too probable that it is in a "don't care" way in every respect, that it is going down hill, and, as Matthew Arnold says:

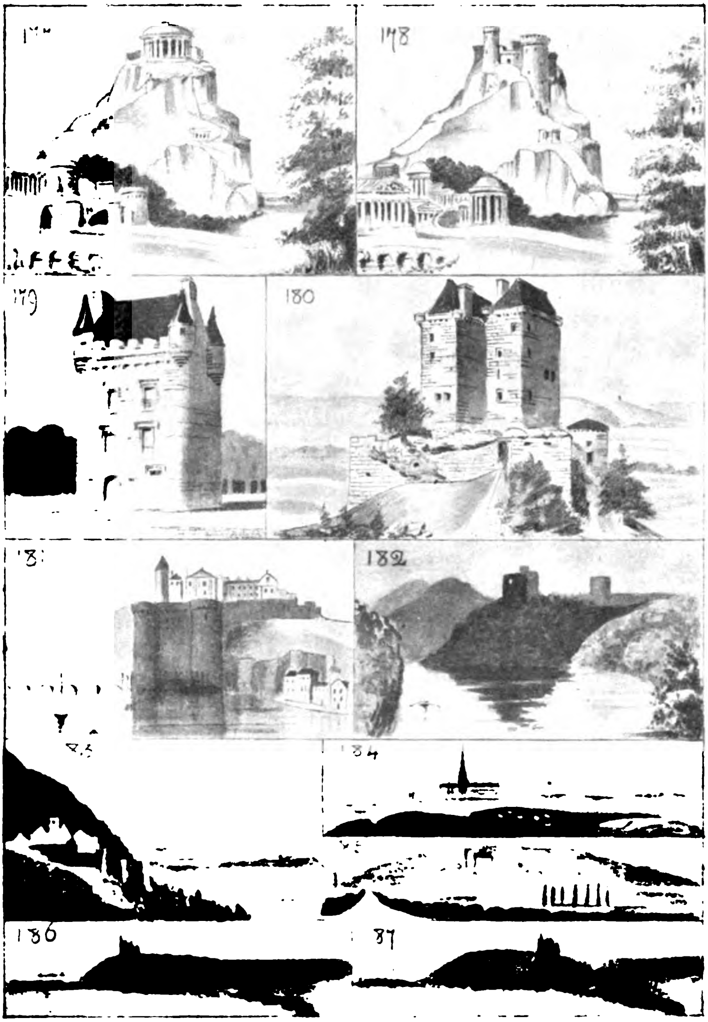
> Letting
> Slow die out of its life
> Glory, and genius, and joy.

Leaving the city, the relation of architecture to the landscape in which it stands takes us finally to the last and widest view of the subject of architectural design. There are few provinces of human labour and invention which, if we follow them out to their final consequences, will not lead us into further and more extended relations with the world around us than we dreamed of at starting; and architecture is no exception. We begin with stones and beams, with the placing of a lintel or the turning of an arch, and we end with finding our work a part of Nature's scenery, lighted by her passing gleams, darkened by her cloud-shadows, or drenched with her rain and storm. The consideration of the effect which the building may have on the landscape, and how the site will affect the building, is one of the most interesting problems in connection with architecture.

The subject may be considered under two heads; as to the

character or sentiment of the building as compared with that of the landscape, and as to its position as a matter of composition. The former relation is one exceedingly difficult to define or to reason about. The harmony of a building with the landscape depends on so many considerations of detail and even of association, that it seems almost impossible to frame any principle which shall meet or explain all cases; it is a matter to be felt rather than reasoned about. It has been said that Greek architecture is specially unsuited to wild and rocky sites, yet the Athenians planted their masterpieces of architecture on the Acropolis rock. The Doric temples of Pæstum are on a level plain; and Linton's large painting of them, No. 1029 in the National Gallery, rather goes to prove that they are not very well adapted for pictorial treatment, at all events, on such a site. On the other hand both Claude and Gaspar Poussin, and other landscape painters of that school, love to combine their classic ruins or temples with foliage and with quiet and pastoral landscapes; and the two elements seem to harmonise beautifully. It must be observed, however, that Claude never uses the sterner forms of Doric architecture, of which in fact he knew nothing; he painted the remains of Roman classic architecture as he saw them combined with Italian scenery. Turner, in such paintings as "Dido building Carthage," and others where a quasi-classic architecture is introduced (quite an anachronism, by the way, as he introduces Italian Renaissance architecture into very ancient classic legend), is fond of the rounded masses of foliage of the stone-pine, in contrast with the straight lines of his architecture. On the whole it may perhaps be said that Doric architecture harmonises best with wild and rocky scenery, and that the lighter and more graceful forms of Greek architecture harmonise best with more pastoral and wooded scenery: though here there

V.



LANDSCAPE AND BUILDINGS.

rises up in the memory Mr. Poynter's picture of the "Visit to Æsculapius," with the great white Doric columns shimmering through a mass of foliage; but that we may say is detail—neither the whole building nor the whole landscape are seen. There is a sketch in the *Liber Veritatis*, in which Claude has placed a small circular temple on the very top of a rock (Fig. 177, Plate V.), and placed his castellated architecture at the base. Here the castle seems to defend the entrance to the town, and the temple is placed safely aloft; but I should like it better if the hill were rounded and clothed in trees rather than a bare rock. I have made a sketch (Fig. 178), copying Claude's composition precisely, but reversing the style of the buildings, and placing the castle at the top of the rock, to try the effect; it gives an absolutely different sentiment to the view at once, and, at all events, illustrates the important effect which the architecture introduced has upon the expression of a landscape. In other drawings Claude adopts the system of placing the castellated buildings on the high and not on the low ground; and some of his pictures illustrate another habit of his, that of introducing a castle or tower to give greater effect, by contrast, to his graceful classic architecture; a hint as to the value of plain spaces in a building in giving emphasis to the more decorative portion.

Generally speaking I think we may conclude, in spite of occasional exceptions, that a stern and severe landscape demands a massive and severe style of architecture, a quieter and more wooded landscape, a graceful and delicate style of architecture; that mountainous ground and a lofty position demand powerful buildings, of comparatively horizontal character, while a low level landscape permits and demands buildings of a less severe style, and with lofty vertical features to contrast with the horizontal lines of the landscape. A spire

on a hill generally looks out of place; there is an instinctive feeling of insecurity; on a low level it is the expression of an attempt to rise, an aspiration, which on the height is uncalled for. On the other hand, a square Scotch castle rising from a level lawn, as in the case of Udny Castle (Fig. 179: it is all built up with modern additions now), looks curiously out of place. Where, as at Borthwick (Fig. 180), the castle is led up to by a precipitous ascent, its stern, rock-like, machicolated towers seem in keeping with their position; and the full wildness and sternness is reached when a castle is, as it were, toothed into crags and precipices, so that you can hardly say where the rock ends and the building commences. A remarkable example of castellated effect of a somewhat different kind is shown (Fig. 181) in Turner's sketch of the Château d'Amboise (*Liber Studiorum*), where the great bastions founded on the lower level seem to stand on guard beneath the habitable château on the top.

A rounded and wooded hill, equally with a bare and precipitous one, seems to require a repose and solidity of form in any buildings placed upon its summit. Turner repeatedly shows his predilection for this effect, as in the sketch taken from his "Kilgarron Castle" (Fig. 182). Every one I think will agree that if, for the compact and square-proportioned masses of castle, you were to substitute a thin and spire-like building, the feeling of the whole composition would be destroyed. It may be observed that this effect of building of a rather solid and horizontal character, rising above undulating masses of foliage, is nearly always pleasing; but on the other hand Gothic architecture, at all events in its more ornate and be-spired and be-pinnacled examples, is out of place among trees and woods, in spite of various rhapsodies of the poets on the subject. For combination with foliage we want level lines and broad masses, which is the reason classic and Italian archi-

tecture generally goes well with a wooded landscape. Gothic architecture of the later period is the architecture of town rather than of country; its multitudinous detail, which in a city supplies an element of richness and variety of detail, in the country only seems attempting to compete with the infinite detail of nature; and its varied skyline does not present sufficient contrast with the equally varied skyline or silhouette presented by trees. The early Cistercian monastery churches, nearly always placed in wooded valleys, were of a broad and simple type of architecture with little decorative detail, and their expression of repose, and the broad simplicity of their architectural design, harmonise admirably with their situation. Such Gothic as Henry VII.'s Chapel, on the other hand, is essentially city architecture. So also are the French cathedrals of the middle Gothic period, with their forest of stone scaffolding in the shape of flying buttresses; in an open country, they would be intrusive and pretentious; in a city, with houses piled up all round their base, they seem the natural expression of the crowded and intricate life of the city. Our simpler English Gothic has in many of its examples an expression of repose and reserve which fits it for the very different position which most English cathedrals occupy, in the midst of an enclosed lawn or "close," instead of being packed up amid heaps of house architecture piled in irregular masses almost against their very walls, as is often the case with Continental cathedrals. I remember being much struck, when I first saw Salisbury Cathedral, with the remarkable fitness of the building to its site; its graceful and elegant design, all completed in nearly the same period of architecture, and therefore with a unity of style and expression which most of our cathedrals have not, rising from a base of level lawn giving admirable contrast and effect to the vertical and pyramidal lines of the building. In this connection it may be of interest to

quote from the letters of Motley, the historian, a record of a similar impression about Salisbury Cathedral:

"This was the first specimen of English Gothic I was to see, and as I walked thither my head was full of the Continental Gothic, which as yet was all I knew. I thought of the Cathedrals of Cologne, of Vienna, of Rouen, of strange unfinished, unfinishable buildings, built according to no plan, or rather according to a dozen different ones, and rising helter-skelter from the midst of a multitude of old, sharp-gabled, red-tiled, ten-story houses, all looking as if built in the time of the Crusaders. The idea of a Gothic cathedral was associated in my mind with hundreds of tumble-down hovels, booths, and shops, mixed grotesquely here and there with a magnificent palace of half-a-dozen centuries . . . so that on the whole, when I came to look on Salisbury Cathedral, I was most ridiculously half disappointed.

"It was my own fault or my own stupidity. The church is of beautiful proportions, of the most beautiful (at any rate the most regular) of the Gothic styles (namely, the Early English), is built of a fine-coloured stone, which looks as fresh as if of yesterday, and with its light and graceful and very high spire, its long lancet-headed windows, its massive walls and stately buttresses, is certainly one of the finest cathedrals I know. Influenced by the associations I have mentioned, I thought the whole scene at first too tidy, too notable, too house-wifish; but, as I said before, this was only my own dulness; on second thoughts I acknowledged to myself that filth and poverty and ugliness were not necessary concomitants of a cathedral, and I confessed that I had rarely seen a more lovely picture than this same church presents. The scene is so softly and sweetly English. The stately and graceful cathedral with its green and smooth-shaven lawn in front, the surrounding elm-trees in their magnificently massive foliage; the tidy cottages half covered with honeysuckles and rose-bushes, the hawthorn hedges, and the green meadows with their sleek cattle (to say nothing of the macadamised turnpike and the new hotel), altogether make up a scene purely and exclusively English, and perhaps, after all as pleasing a one as you can find anywhere."—*Motley's Correspondence*, vol. i., pages 59–60.

It is worth note that Repton, who had an immense reputation as a landscape gardener in the early part of this century, and whose wholesale method of "treating" ancient mansions and parks, so as to get new effects out of them, is satirically referred to in Jane Austen's best novel,* evidently had a strong

* "Mansfield Park," chapter vi.

impression as to the fine effect of broad, solid masses of building, rising out of equally broad but undulating masses of trees. Two of his sketches for effects of this kind, one of Bayham Abbey, the other a composition, show the same idea in both cases—to have square battlemented buildings rising from among undulating masses of trees. Repton may have done many foolish things—probably did—but in his liking for this particular effect he has, at any rate, the sanction of Milton:

> Straight mine eye hath caught new pleasures,
> Whilst the landscape round it measures;
> . . . . .
> Towers and battlements it sees,
> Bosomed high in tufted trees—

an expression which exactly gives Repton's pet ideal.

What was true about Salisbury and its level lawns is true about spire architecture and level country on a more extended scale. Spires, as before observed, are out of place on a hill, and they are not very effective beneath a hill, and this seems to have been tacitly felt by spire-builders. In mountainous landscapes we generally find that spires, if introduced, are mere little picturesque timber and shingle affairs, toy spires; not work of a monumental type. It is on an expanse of flat country that a spire, or a tall tower with a spire or lantern termination, enjoys its true honours. Lincolnshire, most of which is as flat as a plate, is a remarkable district in exemplifying this. There the spires seem to vie with each other in height and slenderness of proportion, as if there was a game of brag between the builders (as there very likely was) whose spire should rise highest and be seen farthest. On such a coast "Boston stump," as it is irreverently called, was a thing worth building; its whole height can tell for many miles landward and seaward, in a district where the land is as flat as the sea;

on a higher and more undulating coast half its value would have been lost. Lincoln Cathedral, on the other hand, standing on the top of the only eminence for many miles round, requires no spires; it may have been intended to have spires, but it is much better suited to its site without them, and perhaps it is the lofty and exposed situation which prevented their being carried out, Nature in this case imposing her own law of æsthetic. Peterborough Cathedral, which stands low in a level country, suffers very much for want of a central spire, and it is to be regretted that the Archbishop of Canterbury's brilliant and cleverly-worded judgment on the Peterborough restoration dispute should have summed-up by dismissing Mr. Pearson's proposed new spire with costs; the spire would have been an effective and legitimate completion to the building and a great addition to the landscape. As it is, Peterborough Cathedral has no means of asserting itself in the landscape; you have to look for it, and have some difficulty in finding it.

The combination of water with architecture is often a source of beautiful effect; in fact there is such an enchantment in the reflection of buildings in calm water that it may almost be said that the poorest and most common-place architecture will have a charm under such circumstances. That is half the secret of the extraordinary charm of Venice; it is not only the peculiar picturesqueness and richness of her architecture, but the having it framed amid the glancing lights and reflections of water, one effect of which, sometimes overlooked, is in the double lighting of the architecture, from above and below. This combination of architecture with still water gives a great added beauty to many of the French Renaissance châteaux, with their moats and often with a partially encircling river or canal reflecting their turrets; also, it need hardly be added, to many of the

Dutch country houses and towns. In a town, unfortunately, there is always a certain difficulty in keeping artificial water clean and wholesome; but if that were surmounted (and it could be with a little care and cost), something might be attempted in this way to give new brightness and variety of effect in cities.

In regard to the combination of architecture with water in the shape of either lake scenery or on a seaside site, the two conditions seem to demand a special and very different treatment. A lake is usually surrounded by high hills, in relation with which vertical features are out of place or are thrown away; and, except in stormy weather, a lake secluded by the hills round the bases of which it is formed suggests an idea of repose of effect; and both this feeling, and the level expanse of the lake water, seem to suggest an idea of level building, of repose combined with grace of structure. A building close on the sea, on the other hand, should above all things suggest the idea of massiveness and stability: rock-like surfaces of wall against which the salt-laden sea wind may beat in vain. Longfellow has summed up in an admirable stanza the expression of the stability of a lighthouse against the storm:

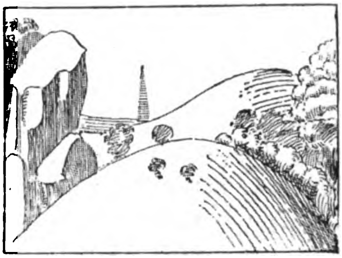
> The startled waves leap over it; the storm
>   Smites it with all the scourges of the rain,
> And steadily against its solid form
>   Press the great shoulders of the hurricane.

In the two last lines you almost feel the tremor of the building under the pressure of the wind. A lighthouse is a special building for a specially exposed site, of course; but what I mean to suggest is that seaside architecture should have something of the lighthouse character about it; it should seem like a bastion against the winds and waves.

Some of the new school of American architects have realised this exceedingly well in designs for seaside houses. It is an odd contrast to this theory, certainly, that as a rule what are called "watering-places," in England especially, are more gimcrack in their architecture than any other class of towns: probably because they are largely composed of lodging-houses run up for commercial reasons, and occupied by no permanent tenants. In the old unsophisticated portions of seaside villages it is curious what a tendency the cottages and smaller houses have to assume a character that reminds one vaguely of boats, so that in railway travelling I have fancied I could tell when we were nearing the sea by this boat-like character, shown in the much larger employment of wood, especially of tarred wood, in the cottages, with an overlapping like the planking of a clinker-built boat. It is quite certain that a cottage in the neighbourhood of the sea will usually have a totally different expression and character from that of a cottage in an inland agricultural district.

In regard to composition in the placing of architecture in landscape, this cannot of course be carried out with the same choice and decision as in a picture, because we cannot in a real landscape impose any special point of view on the spectator; as Shenstone, the poet, discovered when he created an artificial distance in front of his house. This was done by planting the trees at the margin of an open glade in lines approaching each other so as to create a false perspective; a break was made in the line of trees half-way, by a recess on each side of the glade, on the further side of which trees were planted of a much more slight and delicate character, and a dwarf summer-house filled up the end of the vista, painted in delicate and subdued tones to look distant. The Nemesis that overtook Shenstone was that the Lytteltons, who had the adjoining

estate of Hagley, entertained their visitors by bringing them to the boundary to look at Shenstone's perspective from the small end. We may, however, consider our buildings in regard to their effect on the landscape to some extent, without sinking into this kind of bathos. It is of some interest to see how painters like to have buildings placed in their landscape, and some examples in the National Gallery and elsewhere are suggestive in this way. The subjoined sketch has a certain interest, as showing the combination of architecture and landscape in a Mediæval illuminated MS.; one of the only two instances I could find, in turning over many examples, of direct attempt at landscape effect in work of this type. It is from a MS. in Lambeth Palace Library. The care with which the spire is planted just at the junction of two slopes of hill is to be noticed. The earlier Italian painters are delightfully naïve sometimes in the way in which they arrange these things; for instance, in Pinturicchio's series of the "Story of Griselda," in one of which (No. 912, National Gallery) a long wooded hill which runs across the picture is abruptly cut off on each side and a trench left in the middle, to give room to place a triumphal arch on the lower level in the centre of the picture. Turner is fond of having a building as a light object at the foot of a dark hill, and the same composition is seen in Stanfield's "Como," No. 406 in the National Gallery. Turner values a bridge very much as a level line in the midst of a landscape, contrasting and giving value to the undulating lines of the country, as seen in his well-known picture, "Crossing the Brook" (497,



A MEDIÆVAL LANDSCAPE.

National Gallery), and his "Apuleia," 495 in the same collection, in which a series of nearly level lines are maintained across the picture, the bridge forming the most decisive one, which are stopped by a vertical mass of trees on the right. In Stark's "Valley of the Yare" (1204 in National Gallery), the opposite expedient is seen, the landscape alone forming the level line, the building (a church tower) the vertical one. An extended mass of building on a high platform is an effect which takes Turner's eye, as seen in his views of Blenheim and Powis Castle; and a precisely similar use is made of this effect in the remarkable landscape (considering its period) in Gian Bellini's "Christ's Agony in the Garden" (No. 726, National Gallery), where on the left a long mass of buildings on an elevated table-land is shown, bright against a mass of dark rain-clouds. In Ruysdael's picture, No. 990 in the Wynn Ellis collection at the National Gallery, we can see the value which a painter attaches to towers in a level landscape, where the towers at various distances serve both to contrast with the level lines of the landscape and to mark the successive grades of distance, giving scale to the landscape. Claude employs his castles in the same way, as in a composition in the *Liber Veritatis*, where you have a castle near the foreground and a nearly similar one in the middle distance, which serves to assist the expression of distance, by comparison with the scale of that in the foreground. Turner, too, likes to have spires as single vertical objects cutting through the lines of his landscape, as in his views of Salisbury and Honfleur. In hilly country, the opposition of level lines of building cut across by oblique lines of ground is an incident that arises naturally out of the circumstances, and which nearly always produces a pleasing effect. An example of it is the sketch from Turner's "Greville" (Fig. 183), a level plain over most

of the picture, a slope of hills on the left, and the buildings seated on the hill repeating the level line of the plain. As showing the contrast of vertical and level lines, there is a significant design of Turner's (sketched in Fig. 184) showing the spire of Salisbury Cathedral rising across the horizontal line of a long low hill which actually exists near Salisbury (Turner would have had no scruple about inserting the hill if it had not been there, but as a matter of fact it is there), with the obvious intention of increasing the "value" of the spire by contrast with the horizontal line of the ridge of the hill. The effect of the sloping lines of landscape seen between a classic arcade in the foreground is also to be noted in one of Pinturicchio's "Griselda" series before referred to, the one called "The Restoration" (No. 914 in the National Gallery). As an example of fortunate composition of house and landscape in an actual scene, I give the view sketched in Fig. 186, where an ordinary country house has been placed at the exact point where the outline of the landscape seems to require it. In Fig. 187, the same scene with the house put back from the end to the middle of the high ridge of land, it will be seen how completely the picture is spoiled by the alteration.

When there is more than one lofty building brought into the scene, a fine effect will often be realised by getting one in sunshine and the other in the shadow. This may often be seen splendidly exemplified with the two towers of the Houses of Parliament, one of them sparkling in the sun, the other frowning under the shadow of a cloud. That is one of the happy results obtained by Barry's true architectural instinct in placing his two towers at opposite extremities of the building, thus indicating the extent of the building, while at the same time each tower exercises its own independent architectural expression. To put two such towers close together would be to lose half their

architectural value. Turner was also observant of this effect, as shown in many of his works—in his powerful *Liber Studiorum* sketch of the Martello Towers near Hastings, in his sketch of Greenwich from the same collection, one cupola in sunshine and the other in shadow; in his "Coventry," with two spires in sunshine and shadow in like manner, and a third sparkling in front of a rain-cloud. The dazzling intensity with which a tower of any kind will sometimes show when caught by the sun and backed by a deep cloud, especially in thundery weather, is extraordinary; no mere painting can give anything strong enough for it. I remember a sea-coast effect once of this kind, with a white lighthouse standing out against a thunder-cloud, which was so striking, that though it is at least twenty years ago, the impression is as fresh on my mind as if it were yesterday; it seemed to have burnt into one's vision. These brilliant atmospheric effects on buildings are of rare occurrence, certainly; they depend on a concurrence of circumstances; but they show what part a building may play in a moment of extraordinarily powerful landscape effect.

Among instances of special effect produced by buildings in landscape is one of which Turner shows some fine examples—the prominence of a lofty tower of some kind in the foreground, which crosses the whole picture and throws back the distance. There is a fine instance of this in No. 364 of the Turner water-colours in the National Gallery; and No. 276 is a fine example of another rather favourite treatment of Turner's—the piling up of a castle or a powerful group of buildings on an eminence in the very centre of the picture, to which everything else is subordinated. This treatment is also seen in the beautiful miniature landscape in Raphael's little picture called the "Vision of a Knight," No. 213 in the National Gallery, where the effect of the castellated rock is contrasted with that of the humbler

houses seen nestled in the valleys beneath. The effect of a whole town clustered into a valley in this way is very picturesque, giving a home-like air of repose and security; there is an instance of this in Gaspar Poussin's large picture, "An Italian Landscape," No. 161 in the National Gallery. A charming instance of this effect is to be seen from the top of the hill to the east of Hastings, beyond the old town, where you look down and see the old town in the hollow between the two steep rounded ranges of grass-covered hills, as if the town had all flowed down to the bottom and remained there like water in a lake. For what may be called an effect of level and parallel composition, there is nothing more perfect than is to be seen in various corners of Cambridge; the quiet-looking, level ranges of buildings seem to go so well with the beautifully-kept green lawns; an especially charming picture is the view of Clare College from the back of King's, with its white stone façade, combining to some extent the sentiment of both Gothic and classic architecture, rising above green verdure, and the river just by to complete the picture.

The question of *scale* is a very important one in regard to the effect of a building on the landscape; the main point being that a building should be designed so as to show its size, and not appear to be smaller than it really is, as in that case it will tend to cause a deception as to the scale of the landscape also. I give a sketch (Fig. 185) of a curious instance of this from a neighbourhood I once spent some time in, where what appeared to be a cottage, with a gabled roof, was a conspicuous object on the side of a long, low, wooded hill. It began to strike me at last that it was curious that this cottage was always so conspicuous from all parts of the country, and at last I visited it and found it was a large engineering work, a stone reservoir with a low-pitched single-span roof and a small tower

at one end of it, much farther off, and standing on a much larger hill than I had ever suspected; for of course, the idea that it was a cottage, which it exactly resembled in the distance, gave an entirely false conception of the scale of that portion of the landscape. This was an extreme case; but it serves to illustrate the general truth, that the larger you can make your building appear, in respect to its actual size, the larger will the scale of the adjacent landscape appear, when viewed in connection with the building. A similar complaint about destroying the scale of the landscape has been made against a certain other engineering work, not in regard so much to its design as to its actual and positive size; for a resident in the neighbourhood of the Forth Bridge complained to Sir Benjamin Baker that he was "dwarfing the hills," which is certainly the case. However, the scenery bordering that part of the Firth of Forth is not of a very romantic character, and perhaps some of us find the bridge the more interesting study of the two.

In regard to the harmony of tone and colour between the building and the landscape, this is best secured by using local building material where possible; and where the local material is not good enough for the purpose, by using something as nearly resembling it as possible in tone and surface. There is no material like stone for building in the country, in regard to harmony of tone and surface; since stone, however you may shape and carve it, is still a natural material with a natural tint and texture. Patent compressed brick of various types and colours may be very well in towns; it seldom harmonises with a rural landscape, as it is an essentially artificial material; and nothing can be more intrusive in a landscape than the style of modern country house we frequently see, of what is called "brick with stone dressings," spotty in effect and showy

in colour, like the mansion of the rich suitor in "Maud," which set the neighbourhood all agape:

> Seeing his gewgaw castle shine,
> New as his title, built last year,
> There amid perky larches and pine
> And over the sullen-purple moor
> (Look at it) pricking a Cockney ear.

A pretentious building in a town is bad enough, but in the country it is ten times worse; it is a sin against the breadth and repose of nature; and even a building which would not be felt as pretentious amid the crowd and bustle of the town may appear so if transferred to the country, or to a garden scene. Compare some of the older collegiate buildings at Oxford, the quadrangles of Wadham and Brasenose, for instance, harmonising so well with the repose of the green lawns which they enclose, with the new buildings of Keble College, admirable in themselves, but essentially street architecture for a city, showing a bustle of detail and wall patterns quite out of keeping with the character and feeling of an old collegiate town.

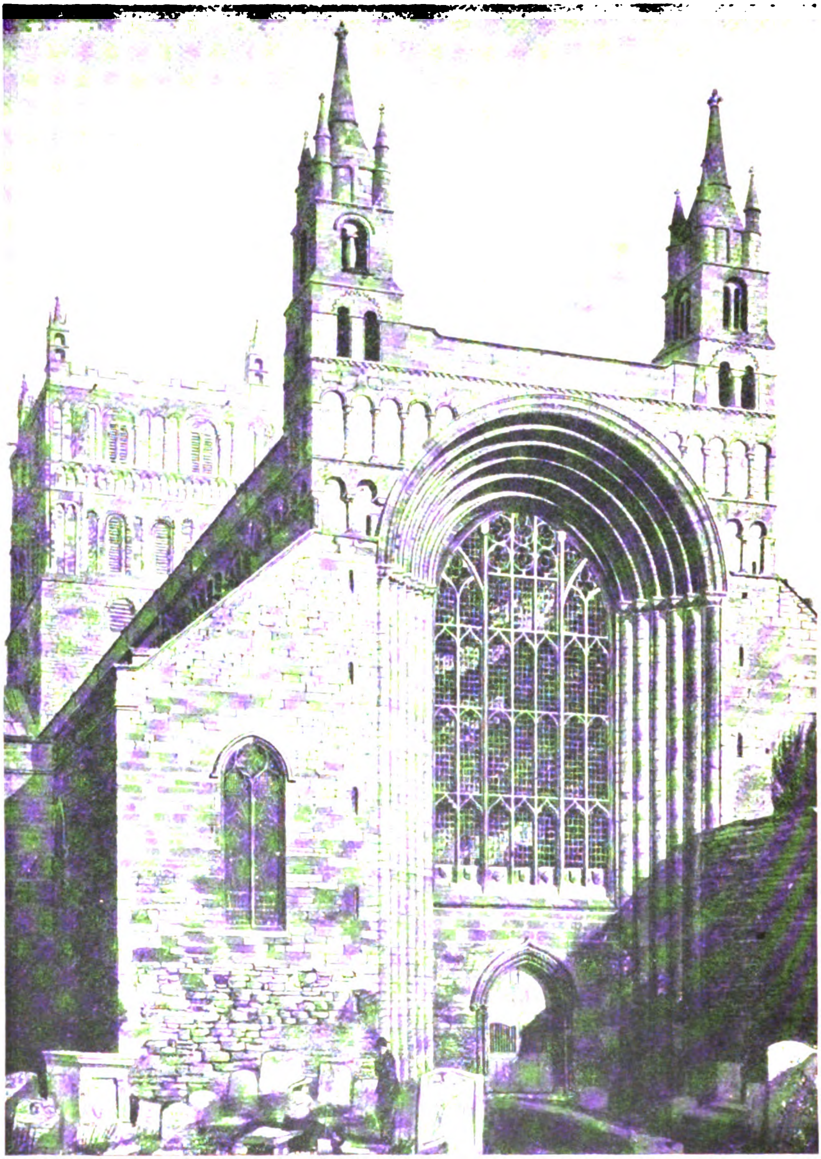
The closest affinity between building and landscape in regard to sentiment and colour is seen sometimes in the case of old country cottages, which have been built in the simplest manner from the materials ready to hand, and have been further tempered by the weathering of many seasons into harmony with the scene; nests rather than houses, which, though habitations made with human hands, appear to be actually blended with nature, so that all sense of their being architectural intruders on the scene is lost. Let an improving landlord pull them down, and build sanitary red-brick cottages of superior construction in their place, and all the charm and harmony of colour are gone. No disparagement to the good intentions of the improving landlord; there are all over this land exceedingly

picturesque cottages which, on sanitary grounds, ought long ago to have been burned. But that is no reason why their sanitary successors should be of such unmitigated ugliness as they often are.

In the case of country houses of the largest class, and where ample funds are available, it is possible to connect the house with the landscape by a formal architectural treatment of its immediate surroundings, in terraces, flights of steps, etc.; the further portions of the grounds being allowed to assume a less artificial and more unstudied aspect, till they ultimately blend almost imperceptibly with the surrounding landscape.* This may be called "landscape gardening;" but it involves much more than is usually understood by that term, and is in fact, when there are opportunities for it, a task entirely within the scope of architecture; and, when successfully carried out, it gives the last touch of interest and effect to the architectural design, rendering it no longer a blot or an intruder on the landscape, but an added charm, giving to the scene the higher interest arising from the presence of human life, and the expression of human taste and intellect.

* This is to some extent, though imperfectly, done in the garden and outlying grounds of Hampton Court; the "Home Park," as it is called, forming the link between the formal garden immediately in front of the Palace, and the natural scenery beyond the park; but the Palace stands too low, and the country is too level, for this treatment to have its full effect.

END OF PART I.



WEST FRONT, TEWKESBURY ABBEY:

FROM A DRAWING BY THE AUTHOR.

HISTORICAL SKETCH.

HISTORICAL SKETCH.

In treating of architecture historically, it is usual to divide up the subject into chapters in which the architectural history and monuments of each country are recorded and described separately; and in a large work, where the subject is to be gone into in detail, perhaps no other method is possible without confusion. But one drawback to this method is that it encourages the common misconception of regarding the architectural style of each country as something complete in itself and unconnected with other styles, whereas, in fact, there has hardly been an architecture practised in any country in the world, at any time, which is not intimately connected in many details, either by way of cause or effect, with the architecture of other countries, or of preceding or subsequent times. Since the Christian era, indeed, we may say that architecture down to the Renaissance period has been almost a continuous development from Roman to mediæval forms, the outbreak of Arabian taste and influence accompanying the spread of Mahommedan power being the only important incident which can be considered as extraneous to this main course of evolution. In India there has been a style of Hindu archi-

tecture carried on through a good many centuries, which, though in the earlier centuries of the Christian era it is curiously mingled with reminiscences and suggestions from classical architecture, is in its main characteristics a separate development; but in spite of a general picturesqueness and some rich ornamental detail, it is too barbaric in character to merit classification as one of the great architectural styles of the world. In such a comprehensive survey as we are endeavouring to make here, we must confine ourselves to those phases of architecture which can justly be regarded as Fine Art, omitting many rude forms of building the interest of which is merely ethnological, or touching on them only where they bear on our main subject, as throwing light on the origin of some forms of plan, design, or construction in the leading styles of architecture.

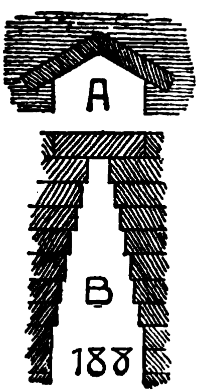
Considering the subject from this point of view, it will appear that, with the exception of the Saracenic architecture of India, which is an important and beautiful phase of the art, the history of architecture as a Fine Art is confined to Europe, to the corner of Africa called Egypt, and to a small portion of the western part of Asia contiguous to Europe. And as with general history, so with architectural history, Rome is the meeting-point between the antique and the mediæval chapters of the history. The Athens of Pericles was the scene, no doubt, of the culminating perfection of antique architecture, but it had little generating influence except by way of Rome; into Rome was absorbed all the columnar architecture of the antique world, and from that, with a certain side influence from Byzantium, was slowly developed the arched architecture which was to spread over the greater part

of Europe at its culmination in the thirteenth and fourteenth centuries.

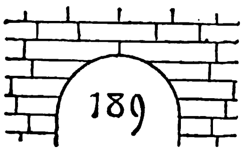
As far as our knowledge goes, or ever can go now, the history of architecture commences on that narrow strip of land fertilised by the Nile water, inhabited by a people whose origin and early history are lost to us, but who maintained a continuous existence as a powerful nation far longer than any other nation of which we have any record, and left buildings of such monumental character that their remains, if cared for and maintained against wanton destruction, seem likely to preserve an intelligible architectural record of their founders for at least as long again as they have already existed. There is nothing in national and architectural history more fascinating to the imagination than this slow-moving development of Egyptian civilisation, which has left its memorials on the earth's surface in the shape of temples dedicated to a worship as solemn and mysterious as their own many-columned and dimly-lighted halls, built apparently without regard to economy either of time, labour, or material. The earliest Egyptian structures, however, to which we can give an approximate date, and those which have made most impression on the world—for during many centuries Egypt was, to the European mind, principally associated with pyramids*—can hardly be reckoned as architecture in the true sense of the word. The great pyramid at Gizeh, which may probably be dated about 4000 B.C., or not much later, is impressive from its scale

* Shakespeare had obviously heard of nothing in connection with Egypt but the pyramids and the rising of the Nile. "Ptolemy's pyramises,' Lepidus calls them, associating them with the post-Alexandrian epoch (*Antony and Cleopatra*, Act II., Scene 7).

and historical associations; otherwise it is but a huge pile of masonry without any features to give it interest or expression; the colossal tomb of a selfish tyrant; and, as Buckle has observed, the most portentous memorial of iron despotism on the face of the earth. Constructively only is it of some interest to our subject, as containing within its bowels examples of the manner in which a passage was bridged against a superincumbent weight before the true arch was discovered (or, at all events, before its use had become at all habitual), either by straight lintels meeting each other at an angle, or by the



gradual overhanging of the courses of masonry till they approached each other at the top (see sections A and B, Fig. 188). It hardly seems likely that the true arch had ever been used at this time, as it would have afforded a far more convenient manner of roofing the internal chambers of the pyramids, and the question of architectural effect could not come into consideration in such a situation; but, on the other hand, it appears certain that the true arch construction must have been known and practised as an occasional constructive expedient long before it made its



mark upon architectural style. As early as the sixteenth century B.C. in Egypt, and subsequently in Asia Minor, the false form of arch represented in Fig. 189 is found; and in the ruins of the Memnonium at Thebes it was found, strangely enough, in immediate juxtaposition with an

opening of about the same width, bridged by an ordinary straight lintel.* This is in principle exactly the same method as B, Fig. 188; and it seems obvious that no builders would go to the trouble of cutting out the ends of the stones to give the form of a semicircle, in a manner which actually weakens them, unless they were doing this in imitation of the form of the true arch, which they had seen but did not understand. And it is curious that we find this problem of the imitated arch again meeting us in the earliest monuments of Egypt which can be said to have real architectural significance, viz., the rock-cut caves at Beni-Hasan. Here we find rock-cut chambers, the roofs of which, as shown in Fig. 190, are apparently supported (for the support was not really required) by eight-sided or sixteen-sided columns with imitation beams over them, and the ceiling cut into a segment of a circle. It seems obvious that this is an imitation of a construction of pillars either of stone or wood, and wooden beams, with an arch in some light material (brick?) turned from one beam to another†; and the probability is that brick arches were

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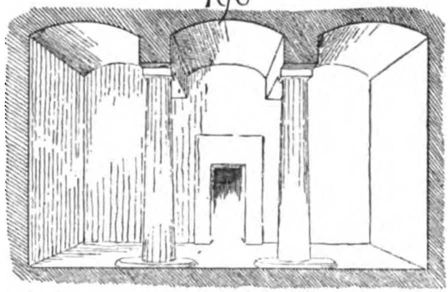
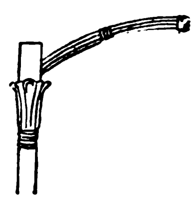


* Lepsius, "Denkmäler," Vol. II.

† The accompanying sketch of a curved roof of reeds, from a painting in a Theban tomb many centuries later (seventh or sixth century B.C.), is interesting in this connection, and may indicate a traditional method of roofing, but it will be



used in small buildings, or in inconspicuous portions of large buildings, centuries before they were allowed visibly to interfere with the horizontal lines of monumental architecture.

It is a "far cry," chronologically, from the great pyramids to the Beni-Hasan caves; a matter of fifteen or sixteen centuries, probably; but we have nothing (existing) between them except other pyramids, obelisks (which are not architecture), and rock-cut tombs with no architectural façades worth speaking of. Mr. Flinders Petrie has lately unearthed a small built temple backed against the base of the pyramid at Medum; and this, of which the plan and section are appended (Fig. 191), is perhaps the oldest building known (probably *circâ* B.C. 4000); but it has no architectural attractions; the plan alone is significant, as showing already that tendency to gloom and mystery in the interior of a temple which was to be carried out on so grand a scale in the great temples of the later period. It is planned like a photographer's dark chamber, with an in-and-out arrangement of walls as if to shut out the light in the most complete manner. The tombs of the early period, however, contain paintings and rock-cut details which are of architectural significance, as giving us some idea of the nature of the Egyptian palace architecture of that period which has entirely perished; an architecture which, as indicated in these rock-cuttings (Fig. 192),* has

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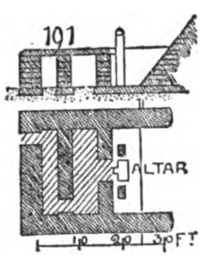
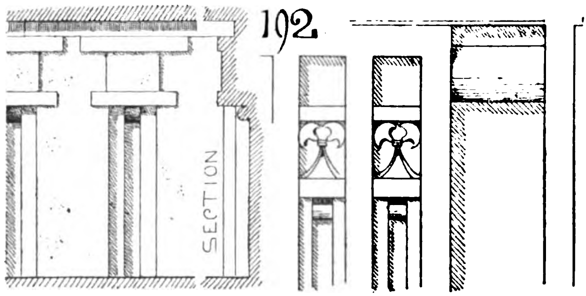


observed that the column is of a much slighter type. There could have been no need of columns of the proportions and make of those shown at Beni-Hasan, to carry a reed roof.

* Lepsius, Vol. I.

an exceedingly timber physiognomy. It contains, however, the suggestion (not shown in this illustration) for

192.



the subsequent almost universal form of cornice in the later Egyptian temples, which has been already mentioned and illustrated (page 131), and it is also of interest, as will be seen just now, in connection with the Assyrian remains of a subsequent period. Some of the rock-cut tombs at Gizeh, of the same approximate period, also exhibit a feature of interest in the shape of a large rounded convex moulding worked over the doorways (Fig. 193), which is entirely abandoned in the fully developed Egyptian architecture of the later period, and which appears to be a reminiscence, cut in stone, of a round log of wood which we may imagine to have been used, in a still more primitive period, as a lintel over the doorway of a hut.

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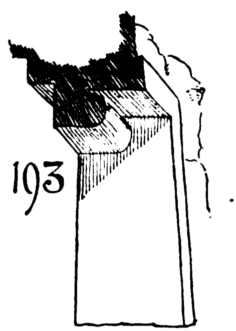
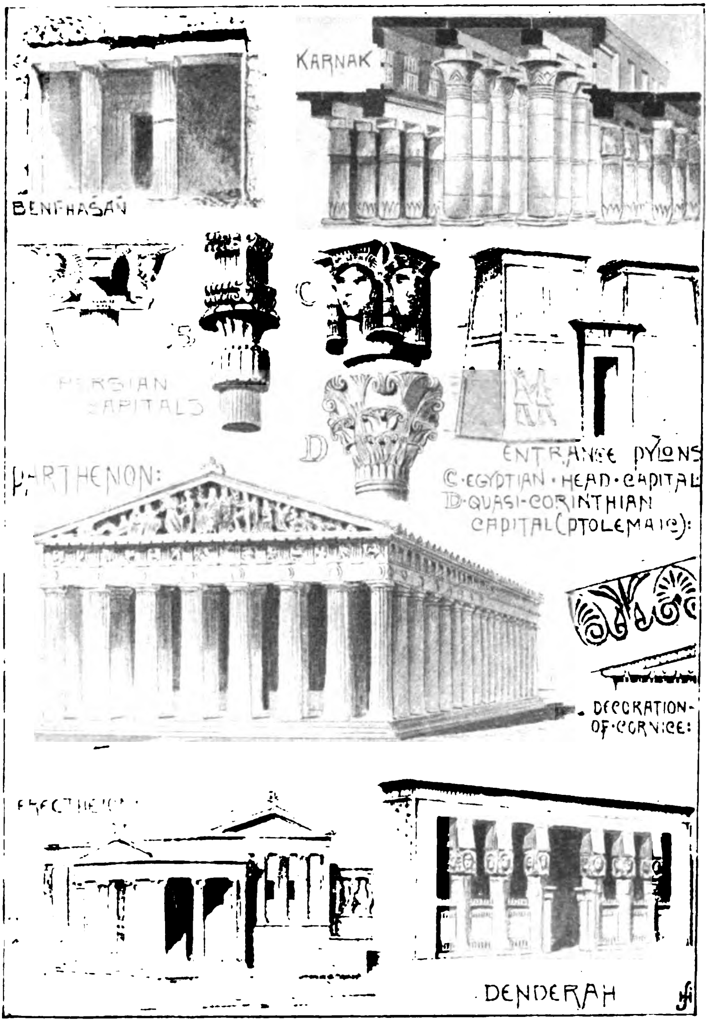


But the great interest of the Beni-Hasan caves lies in the aspect of the outer façades of some of them (see Plate VII.). No one can compare this with the façade of a Greek Doric temple without the conviction that here was the original

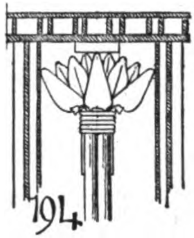
germ of the Greek Doric column, although in a very rude stage.* A few columns of the same type are found in one portion of the great temple at Karnak, and till very recently these were the only examples, and it might well be matter for surprise that a columnar feature of this type, so different from the usual forms of Egyptian column, should have occurred only in this accidental kind of manner in one or two places, and apparently not been followed up anywhere else. But the recent disinterment of the remains of the temple and precinct at Deir el Bahari, attributed to about the date 1500–1400 B.C., has put the matter in quite a different light. We have here whole colonnades on three faces of a great quadrangle, as well as a small hypostyle hall of the usual type, entirely carried out with columns of the Beni-Hasan form; so that it is evident that the use of this form of column in Egypt must have been more prevalent than was hitherto supposed. The discovery of the more extended use of this proto-Doric form of column considerably increases its importance and significance as the probable precursor and rough origin of the Greek Doric column, as we find it developed into a symmetrical architectural feature, in the archaic Doric temples of Pæstum, Selinonte, and Corinth, in probably the eighth or seventh centuries B.C. Why the Greeks should have selected this as a form for further development in place of the far more prevalent and striking column of the later Egyptian architecture; and what were

* Tourists with a smattering of architecture are apt to say, when they see these columns, "Oh! there was Doric architecture in Egypt ever so many centuries before Athens!" a statement which I have seen more than once in print, and also as a "mem." in a lady's sketch-book. If they will get some one who has eyes to point out to them the difference between the refined detail of the Parthenon column and this rough "blocking-out" of it, they will perceive their mistake.



EGYPTIAN, PERSIAN, AND GREEK.

the transition stages (for there must have been some) between this very crude form and the far more refined and truly architectural form of even the archaic Doric column; all this is a mystery of architectural history which will probably never be cleared up.* But the form on which the Egyptian mind fixed for its principal and typical architectural column was one based not on geometrical shaping but on the imitation of natural growths, and this is indicated in its crudest and least architectural form in another bit of rock-carved representation (Fig. 194) of the same neighbourhood and period as the Beni-Hasan caves. This is a very curious affair, for it is all but a realistic representation of a bundle of stems and buds supporting what looks like wooden construction. Nothing could be more unarchitectural in appearance than this; in one of the Beni-Hasan caves it appears treated a little more architecturally as a separate-standing column,† but still with its origin from the idea of a bundle of reeds clearly marked. When it reappears in the great period of Egyptian architecture, the eighteenth

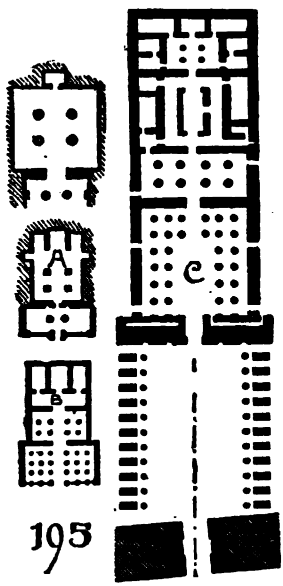


* It is possible that these "proto-Doric" columns of Egypt are rock cut representations of a primitive built architecture of similar type, which may at one time have been much more widely spread, and have come to the Greeks by another channel; but this can now be only conjecture. It has been questioned by some recent critics whether this form of Egyptian column had really any connection with Greek architecture; but I can hardly understand how any one could see the colonnades of Deir el Bahari without being struck with their remarkable resemblance to Doric architecture in a crude state; and at all events, this form of Egyptian architecture affords the only suggestion for the origin of the Doric column which has yet been discovered.

† Shown among the examples of early forms of column on page 56 (Fig. 49).

P

and nineteenth dynasties (1830 B.C. to the Exodus), it has lost all its reed form and become a single cylindrical column, but with the main outline, the reminiscence of the bud, still preserved rather too closely for monumental architecture, and alternates with the capital derived from the shape of the opened flower, as shown in the sketch from the colonnades of Karnak on Plate VII. This spreading form of capital still preserves the semblance of a flower in outline, but it is very conventionally treated and with very pure decorative lines both in outline and in surface detail, and may be said to be, in this shape, a piece of true and very fine and expressive architectural detail.



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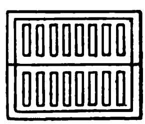
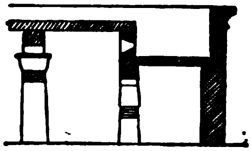
The period of five centuries or so between the date of the Beni-Hasan caves and that of the great temple-building era of the eighteenth and nineteenth dynasties is a gap in the architectural history of Egypt, being the time when Egypt was ruled by the "Shepherd" invaders, who made themselves hated by the nation, and whose monuments, if they erected any, are supposed to have been destroyed after their expulsion. So that it may be said that Egyptian architecture before their dominion was an architecture of tombs, and arises after their expulsion as an architecture of temples, with little connection architecturally between the two epochs, save in the general form of the bud column, and the fact

that the plans of some of the tombs seem a kind of foreshadowing on a small scale of the system of planning carried out on a great scale in the temples; that of a wide and impressive façade in front of chambers which grow smaller as we penetrate into them. That, as observed on page 34, is the special characteristic of the Egyptian plan—the plan which embodies "mystery." In its simpler form it is a colonnaded chamber, with a portico of two or more columns in front; some of the smaller plans, along with that of the small temple at Karnak (C), are given in Fig. 195, to show the development of the plan. In its most elaborate form the plan will consist of a fore-court with two great pyramidal-shaped blocks called generally "pylons," forming the outer façade (Plate VII.), with the entrance between them, leading to a large fore-court with a colonnade on each side, thence to a second court somewhat smaller than the first and more elaborately decorated, either with colonnades or colossal statues, but still open to the sky; thence to the covered Hypostyle Hall* which was the great glory of Egyptian architecture, set thickly with columns, of which the two centre rows are higher and of different design from the side ones, leaving space for light to be introduced above the lintels of the smaller columns, through barred stone windows, as shown in the annexed sketch; thence into a series of chambers, of which the central one was the sanc-



* This word was compounded from ὑπο and στῦλος, to signify a hall lighted from above the lower ranges of columns, by some one who was apparently rather careless about his Greek, and confounded ὑπο with ὑπέρ: ὑπο would mean "from below," not "from above." "Hyperstyle" would be the correct expression; but as "hypostyle" has become the currently accepted term it must be retained.

tuary, the disposition of the others varying. Occasionally there is a second smaller and lower columned hall intro-



duced between the Hypostyle Hall and the sanctuary, an arrangement which seems to prefigure, and perhaps is really historically connected with, the floor space at the transept or crossing between the nave and choir of the Christian

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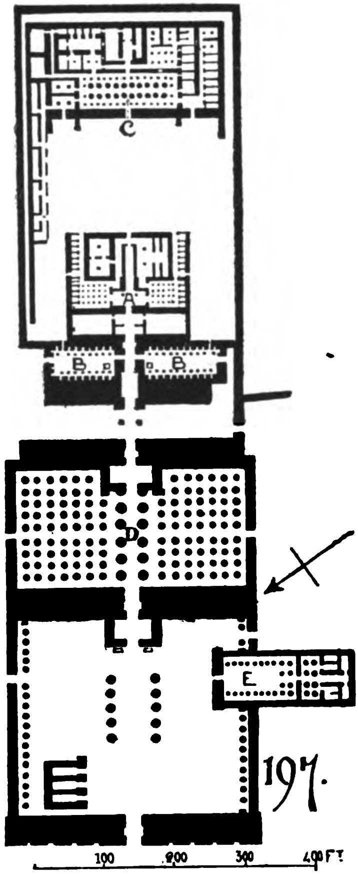
church. The great cylindrical surfaces of the columns were elaborately painted in brilliant colours and in a somewhat barbaric style, which, however, would no doubt be modified in effect by the subdued light. The roofed portions were covered with massive slabs, laid flat. Instances have been found in which a little light was introduced into the inner cells of the temple, on the same principle as in the Hypostyle Hall, where the differing height of the roofs admitted of the arrangement, as in the annexed section.

The great monuments remaining of the age we are now speaking of are the temples at Karnak, Luxor, and Medinet Habou, and the Rhamession at Thebes. The building of such monuments must have extended over a long period, in days when there were no machine-tools or steam-cranes; and Karnak was, in fact, commenced before the Shepherd invasion (though the portion then built—A, Fig. 197—is not important), and afterwards several successive monarchs completed it, Amenophis I. enclosing the old

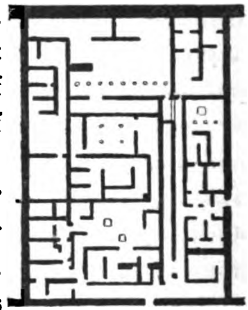
portion in a new temple; Thothmes I. adding a hall surrounded by colossi (B); Thothmes III. a palace, or temple (C), with columns (Fig. 196) of very peculiar form (important historically, as we shall see just now); Manephthah built the great Hypostyle Hall (D), and other succeeding Kings completed the group of halls and courts. A small sketch-plan of the whole is given (Fig. 197), reduced from the large restored plan given by Lepsius.



197.

Two or three years ago Mr. Flinders Petrie discovered at Kahun the plan of a small town of the older Theban period (the XIIth dynasty), apparently built for the people engaged on the pyramid of Osirtasen II. Among the many plans laid bare were some of houses of good size, of one of which the plan is appended (Fig. 198), from an illustration published in the *Builder* at the time of the discovery. The destination of the different rooms is not very intelligible; but we observe the same peculiarity of long parallel passages which is found again in the ancient Homeric house at Tiryns, and probably a rose from the separation of the dwelling-house into men's

and women's apartments which was universal in the ancient world, and led to the necessity for such passages for separate access to the two sets of rooms. It is noteworthy that several brick arches were found in the cellars of these houses, and also remains of columns of the Beni-Hasan type.



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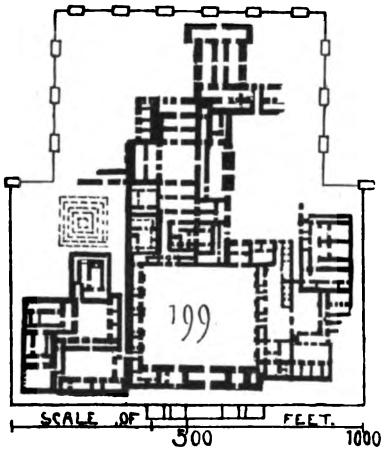
Whether by mere coincidence or otherwise, the great temple-building era came to an end about the period assigned to the Exodus, when, as Fergusson significantly remarks, the Egyptians "lost their slave population"; an event which would certainly have some effect on the building of works requiring such enormous labour. Meantime, another great power had been slowly developing along the banks of two other historic rivers, the Euphrates and the Tigris. Assyria, however, has left us no remains in a sufficiently complete state to judge of their architectural effect, as we can of those of Egypt, and the interest of such remains as are intelligible is rather historic than artistic. The grandeur of scale and style of the now world-famous winged and human-headed bulls which adorned the entrances of the Assyrian palaces, justifies the conclusion that the architectural effect of the buildings was commensurate with such decorations, but they must have been built in a manner the reverse of monumental, and little but the foundations and the lower portions of the walls remain. Bas-relief representations give us some incomplete hints as to what the general style and treatment of the buildings may have been, and upon this basis valiant "restorations" have been accom-

plished, especially by French archæologists, and copied from book to book till they have come to be almost accepted as representations of actual fact.* What we know certainly is, that Assyrian architecture was essentially an architecture of palaces and fortresses, and not of temples; we have the form of plan of these palaces, the treatment of the lower portion of the exterior walls, and some of the decorative details. The actual remains show that the palaces were approximately square, and were built on artificial platforms, while the bas-relief representations leave little doubt that the general tendency was to build in stories of diminishing area, each upper story leaving space for a terrace round it on the roof of the

* Readers who take up any of the larger and more monumental books on architecture, especially French ones, should be warned against being led into accepting fancies for facts. The French Government, with an enlightened liberality which puts ours to shame (or would if it had any shame left about such things), continually spends money in commissioning architects and archæologists to visit and draw ancient remains, and in publishing the results; and no architects are more exact and conscientious than the French in drawing the actual remains, but they seem always to think it their duty to produce a set of splendid plates of the buildings as they might have been. It is a regular process: "État Actuel," a few courses of stone, a moulding, and the base of a pier or two; then in the next plate, "Restauration," the whole soars up in every detail, evolved from the critical perceptions of the author. There is no task pleasanter or more interesting than this kind of restoration—provided only it be remembered that these charming pictures are no more than conjectures; but they get copied from one book to another, till at last all memory of their fanciful origin is lost, and they are accepted as history. Our own architectural historian, Fergusson, whose great work is no doubt the most remarkable general history of architecture that has been produced, had the same weakness, and when he had propounded what he thought a satisfactory theory about any ancient structure, always treated his theory thereafter as a fact, and proceeded to make deductions from it as such.

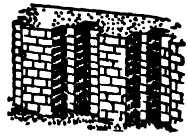
lower one. The general arrangement of the plan of an Assyrian palace was that of a large open courtyard, not central, but at one side of the platform, with apartments opening out of it (Fig. 199). Access to the platform was by stairs or long inclined slopes built against the retaining walls of the platform. Such architectural details as exist show on the one hand a connection with Egypt, on the other hand (as we shall see) the germ of some details in subsequent Greek architecture.



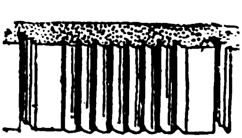
REMAINS OF PALACE AT KHORSABAD, AS DISCOVERED BY M. PLACE.

The details which recall Egyptian work have been generally supposed to be derived from Egypt; the supposed founding of Nineveh about 2200 B.C. is mythical, and the principal Assyrian remains, at Koyunjik and Khorsabad, do not date further back than about 1300 B.C.; the date, it is significant to note, of the termination of the great Egyptian architectural period. Some recent researches by M. de Sarzec, the French Consul at Bagdad, however, have brought to light the remains of a much earlier palace further south, near the junction of the Tigris and Euphrates, with the same type of plan as Khorsabad, and containing inscriptions of Kings who are known to have been earlier than even the assumed date of the founding of Nineveh. The walls of this building were built with a series of vertical breaks externally, as shown

on the appended sketch, which at once recalls the vertical strips of the Egyptian rock-cut framework, Fig. 192. This discovery of the "Palace of Gudea," as it has been called, leaves room for the question whether architectural influence may not have travelled in the first instance from Assyria to Egypt, instead

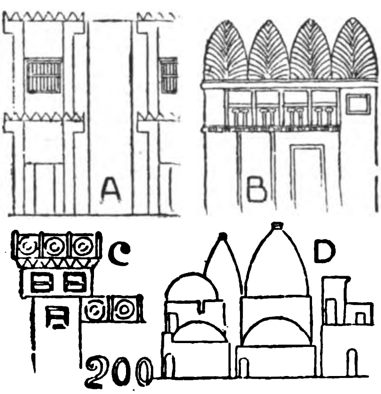


of the reverse way; though it is doubtful whether the materials can ever now be obtained for rendering this idea anything more than a speculation. The vertical treatment of wall-spaces is found again in the Assyrian remains at Khorsabad and elsewhere, in the shape of large reeding ornaments on the surface of the walls, sometimes combined with the



ASSYRIAN WALL.

flat vertical divisions characteristic of Egypt. This is a very poor way of treating a building architecturally, and must have tended to make the exterior like a great wooden box rather than a building; the Egyptians seem to have used this system only for their dwelling-houses (probably actual wooden constructions), as we gather from occasional representations in their paintings, and rose to a nobler style of architectural detail for their temples. There is



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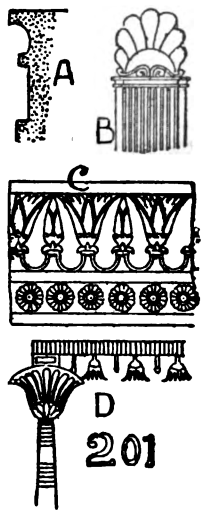
an obvious similarity between the representation of an Egyptian house, A, Fig. 200 (from a painting on

the wall of the Memnonium at Thebes), and that at B, from a bas-relief at Koyunjik; the same timber construction is evident in both. In cut C, also from Koyunjik, we find the zigzag finish shown in the Egyptian representation, and which probably represents roughly some kind of battlemented finish to the wall; only that in the Assyrian example, which is a fort, there is a fighting stage or platform mounted above this. In all three, windows are shown in much the same fashion. The Egyptian example is some centuries older than the others. The peculiar ornaments over the roof line in B are probably conventional representations of shrubs forming part of roof gardens (which we know was an Assyrian predilection), as they exactly resemble the representations of trees dotted about the landscape in other bas-reliefs. The domed group, D, from another Koyunjik bas-relief, is a curious exception to the usual representations of buildings in these Assyrian bas-reliefs; and though there is no reason to think that Assyria possessed a domed architecture on any extensive scale, this representation seems to imply that domed or arched roofing was not unknown there, and was probably used as a constructional expedient where convenient, or where a flat roof was not wanted. That there was a general taste for flat roofs and terraces on them is evident, but it is not probable that the whole roof area of a great palace, with rooms of many different sizes, was one flat expanse, as it is shown in the usual "restorations." It may be added that the general prevalence of long and narrow proportions in the palace rooms (see plan, Fig. 199) points to a difficulty in roofing, which shows that the Assyrians could not have mastered the building of arches or vaults on a large scale, though

they may have used them on a small scale and in special situations. Arched gateways to the city were actually discovered by M. Place, at Khorsabad, with the circumference of the arch ("archivolt" is the technical term) ornamented with figures and pateræ in blue and yellow enamelled brick; but the widest of these arches is only eighteen feet span.

Though we can know nothing certainly as to the general architectural appearance of these Assyrian palaces, there are details found among the remains which are architecturally important in relation to other architecture before and since them, of which the four in Fig. 201 may be specially noticed. That marked A is a section of a moulding from the remains of a building at Khorsabad, which has an evident connection with the typical Egyptian crown moulding shown on page 131; B, C, and D, we shall have to refer to presently.



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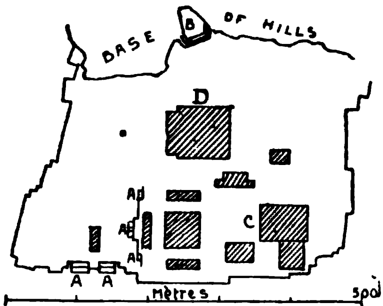
From Assyria our survey extends to Persia on the east, and through Asia Minor to Greece on the west. We turn first towards Media and Persia, as most closely connected architecturally and historically with Assyria, the Medes having actually conquered Assyria about B.C. 606. In Persia we find again the prevalence of a palace architecture built upon great artificial platforms, but, as far as we can judge, with a much more highly elaborated and artistic architectural treatment, and with a grand disposition of that always effective architectural feature,

a great flight of external steps. The platform and architectural remains of the palaces of Darius and Xerxes, at



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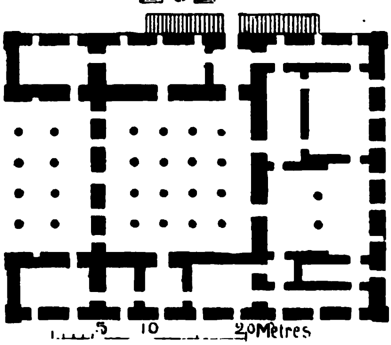
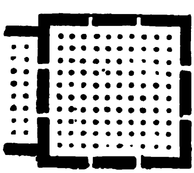
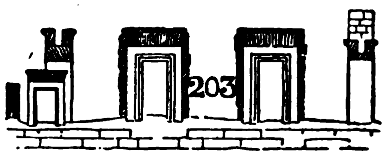


Persepolis, form the principal evidence of what Persian architecture was at its culminating period. Here we find remains of an imposing arrangement of wide return flights of steps against the side of the platform, the walls forming the backing of the steps having been decorated with bas-reliefs of animals and hunting subjects, and figures of kings and their attendants. The effect of these stairs with their sculptures must have been exceedingly striking when perfect. In the remains of the palaces on the platform we find a type of plan which at once reminds us of the Egyptian temple, the great halls being square apartments



with a number of columns equally spaced over the area. Fig. 202 gives the general plan of the platform, with the plan of one palace to a larger scale (the small one, C, in front of the platform). Annexed is also a small sketch plan of the larger palace at D. It is not improbable that these halls were lighted by small windows near the ceiling

and above the line of capitals of the columns, as in the hypostyle halls of Egypt, but this is only conjecture, though we may find it treated as fact in various standard books. The steps to the platform and entrance portico are at AA; at B is the colonnaded rock-cut façade called the tomb of Darius. The remains of the architecture present the curious phenomenon of a series of detached piers and door and window erections in stone, with nothing to connect them (Fig. 203), showing that the intermediate portions of the walling must have been formed of some perishable material (probably unburnt brick) which has disappeared.



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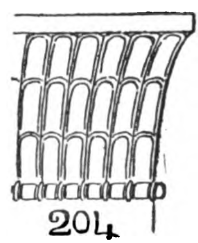
Two or three remarkable details deserve notice. One is the form of door and window heads (Fig. 204), again a variation of our old friend the Egyptian crown moulding, which meets us everywhere in antique architecture. The columns afford two forms of capital, both remarkable (Plate VII.). The bull capital (A) in the form of a double bracket, is one of the most picturesque special forms of capital that has been designed, and it is curious that it has neither antecedents nor successors in any direct connection with it; as an antique detail it is peculiar to Persia. The other capital (B) may be said to be one of the worst designed features in existence, the different portions being merely stuck on to one another with no structural or æsthetic connection; but it has a certain interest in that the bell-shaped portion has some resemblance to the Egyptian capital of Thothmes III.



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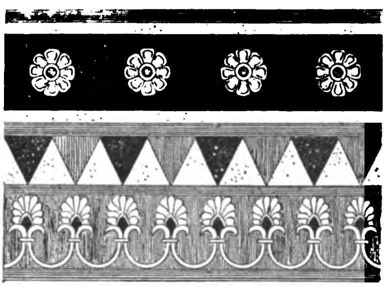
(Fig. 196), and the portion above that has been thought by some to be the origin of the horizontal volute of the Greek Ionic capital, only set on end instead of horizontal. This is hardly likely, but the two features have probably a common origin.* Other important Persian palaces were at Passargadæ and Susa; but, though M. Dieulafoy's discoveries of sculpture decoration at the latter site are of the greatest interest in themselves, the remains afford little for the architect; and Passargadæ, somewhat earlier than Persepolis, only affords us the rather interesting fact that the masonry of the retaining walls of the platform, portions of which remain, was channelled or "rusticated" at the joints in a manner much more like Roman work than the usually more ornate and rather barbaric wall-decoration of Persia.

It should be noted that we find the winged human-headed bull as a guardian of the gates at Persepolis, in the same semblance as in Assyria; an evidence of the close connection between the art of the two peoples; and also that we find as ornaments a cresting (Fig. 205) somewhat similar to ornaments at Koyunjik (B, Fig. 200), and the device of a rosette



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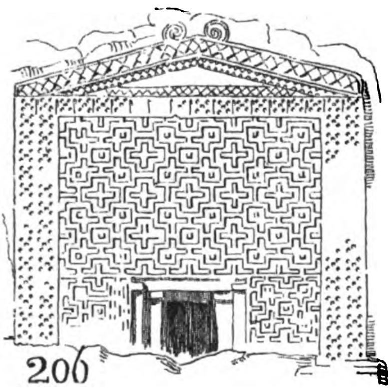
* In many instances the bracket capital (in the form of a horse or a bull) was actually mounted on the top of this bundle of scrolls, making about as clumsy and grotesque a combination of forms as could well be imagined. A modern architect who designed anything so bad would be ridiculed; but most writers on architecture seem to lose all faculty of criticism when dealing with ancient work.

spaced at regular intervals; both which details we shall have to recur to again.*

We now turn westward into the region of Asia Minor. It is singular that so little is left here of architecture on a large scale, in spite of the known wealth and power of some of the ancient rulers whose names, and the names of whose cities, are familiar in history. This is probably in great measure for the same reason that Assyrian and Persian remains are so imperfect—the employment of perishable materials. On the other hand, Asia Minor contains much rock-cut architecture, some of which is of considerable interest in its historical bearing. One remarkable monument found in Phrygia, and known as the tomb or monument of Midas (Fig. 206), resembles no built architecture of which we have any record, but may be just

* Further south are some buildings of rather rude architecture and of distinctly domed style—at Serbistan, Firuzabad, and elsewhere—which up till recently have always been supposed to be early buildings of the Sassanidæ, who came into rule in Persia in the third century A.D., and whose architecture is of some significance, as we shall see, in connection with the development of the Byzantine domed architecture. M. Dieulafoy has set up the theory that these domed buildings were the work of the Achæmenidæ (6th century B.C. *et seq.*), the dynasty to which both Cyrus and Darius belonged; and Professor Aitchison, in his lectures on Byzantine architecture at the Royal Academy, apparently supports this view. I can merely refer to it here, as a point in dispute. On the one hand, the theory does seem to give some additional significance to that representation of a domed Assyrian structure from a Koyunjik bas-relief, before referred to (D, Fig. 200). On the other hand, we know that the palaces at Persepolis cannot have been essentially domical structures, because there is not a trace of any piers of the mass or outline that would be required to support a large dome; and if we are asked to believe that two totally different styles of building were being carried on almost at the same time and under the same dynasty, at two places only fifty miles apart, I can only say that such a circumstance would be absolutely unique in the history of ancient architecture.

mentioned in passing as possibly affording a suggestion of the architectural treatment and decoration of some of the



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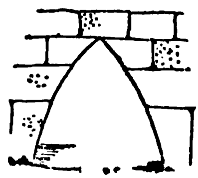
ancient cities of Asia Minor, which were more Asiatic than Greek in their connection. The most interesting class of tombs are those in Lycia, which show with the utmost naïveté the imitation of timber construction in rock, of one of the best known of which a sketch is given on page 58 (Fig. 55), and which, as there observed, seems to indicate the timber origin of some of the features of Greek architecture. Lycia contains many such rock-cut monuments, all of the same main character, some of them cut fairly out all round, and with gabled roofs with, in general, a convex curve; two of these are now in the British Museum. Among these are also simple forms of columnar architecture, the connection of which with Greek architecture is still more obvious.

But before touching on the great columnar style of Greece, we must notice one class of construction found on the soil both of Greece and of Asia Minor, and also in Italy, and which it is the custom to call "Pelasgic," a name which does as well as any other. The most important monuments of this class are the subterranean structure known as the tomb or Treasury of Atreus at Mycenæ, and the pointed-arch gallery at Tiryns. The latter is composed of large blocks of masonry, with no architectural details at all; in the Treasury of Atreus the blocks are smaller, and the masonry shows marks where metal ornaments

were fixed, but is in its present state as bare of architectural detail as Tiryns. The feature common to both is the use of the pointed arch built with horizontal courses, on the same system as already noted in some early Egyptian structures. Remains of this character of work are found at various sites in Asia Minor, and occasionally in Italy; they may date about 1000 B.C.; they are not architecture in the artistic sense; but they should be noted in any architectural history, however brief, as showing the existence on Greek soil, before the Grecian era proper, of a building people of a race evidently totally distinct from the Greeks.



The main characteristics of Greek architecture have been described in Chapter II., where we took the Doric Greek style as the best typical illustration of trabeated architecture; and we noticed (page 69) how the Greeks alone, among ancient architects, employed, side by side, details and forms of distinct character choosing and treating them according to a process of pure reason, instead of merely following collectively a single type of design.* When we come to consider Greek architecture in a historic sense, we find it evident that its main elements were collected from different directions, geographically and ethnologically. The Doric style of Greece is considerably older than the Ionic; and bearing in mind the proto-Doric columns of Egypt before mentioned, there

* This employment simultaneously of different forms of column and of decorative detail is, of course, quite a different matter from the employment of domed buildings along with trabeated columnar buildings, which has been suggested as so improbable in the case of Persepolis and Serbistan. That is a difference in the whole idea and constructive type of the building. It is as if we were to find the Parthenon and St. Sophia built by the same people.

can be little doubt that this style of Greek architecture comes direct from Egypt, and not by way of Assyria and Asia Minor. Not only is there, in the façades of Beni-Hasan and the colonnades of Karnak, the obvious hint for the development of the Doric column, but we find that the earliest examples of Grecian Doric, in the shape of the fragment of a Doric temple at Corinth, and most of the Doric temples at Selinus (Selinonte) in Sicily, are of completely Egyptian proportion; the Corinth columns, only four and a half diameters in height, being even more massive in proportion than any Egyptian columns. There

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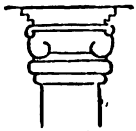
is one curious exception at Selinonte, in which the column, very wide at the base, tapers excessively (Fig. 207), as if the builders had been trying experiments. As this is the only octastyle temple on this site, it may be a later example than the rest (for reasons which will appear just now). We have lost the links between the Beni-Hasan form of column and the complete Doric; for though the Corinthian and Sicilian temples are much coarser in detail than the Parthenon, all the characteristic details of Doric are there; the stages by which they were elaborated must have taken place in buildings of which no trace is now left. On the other hand there can be no doubt that the Greek Ionic order with its decorations is of Asiatic origin. We see it portrayed in a rude form in Assyrian sculpture at Khorsabad (Fig. 208), and we find it the predominating form in those rock-cut façades of Lycia which introduce columns (Fig. 209), and in the absurdly designed columns of Persepolis and Susa

the volutes set on end are, as already observed, the same form with probably the same origin, whatever that was.*



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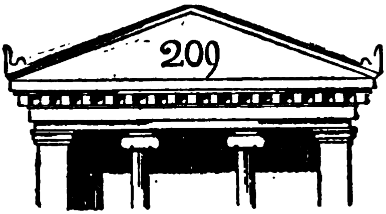
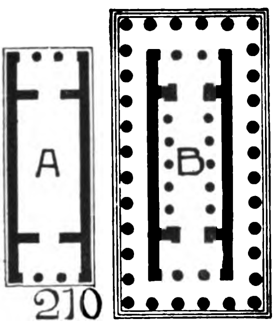


If, again, we compare the ornaments from Koyunjik and Khorsabad, Fig. 201, C, and Fig. 205, with the ornament from the Erechtheion, Fig. 77 (page 81), and that shown in Fig. 152, Plate III., we can have no doubt of their relationship. Fig. 201, C, itself has close resemblance to a common form of Egyptian ornament, so that here the connection in both directions is obvious. The sketch in Fig. 201, D, from a painting in a Theban tomb of the eighteenth dynasty, given by Lepsius, shows a somewhat similar ornament introduced in the shape of a pendant fringe. This form of ornament is used as a painted ornament on Grecian Doric buildings, but as a carved decoration incorporated with the architectural design it belongs more especially to the Ionic order. The derivation of the Corinthian capital, as before observed, seems to be mainly Egyptian, though it may have received modifications by way of Asia of which the evidence is wanting.

* An American architect, Professor Goodyear, has published a profusely illustrated essay to show that the Ionic volute was developed, by many intermediate stages, from the lotus ornament of Egypt. His illustrations are a most interesting collection in themselves, and his essay worth attention, but I have not found it convincing. The feature seems to me to be distinctly of geometrical rather than natural origin, like other forms of ornament in which the spiral plays a part.

There cannot be a doubt that the temple of the Greeks is architecturally related to that of the Egyptians, though the fact that all the Egyptian colonnading is internal, and the principal colonnading of the Greek temple is external, seems at first sight to contradict this idea. But in fact we have become so accustomed to think principally of the exterior colonnade and entablature of the Greek temple, as representing the "order" which has had such an influence on the subsequent architecture of the world, that we are apt to forget that the interior compartment, the *cella*, was after all the essential *raison d'être* of the building. And the simplest form of the Greek temple, as described by Vitruvius, —the temple *in antis* (Fig. 210, A), or with two columns in the front between *antæ* or pilasters, is nearly the same as the simpler forms of rock-cut Egyptian façades (see Fig. 195). The addition of a colonnade surrounding such a temple (210, B) gives the *hexastyle* temple of the Greeks, a temple with six columns on each of the end façades. This hexastyle form was the most usual in the earlier Greek peripteral temples*; the *octastyle*, with eight columns at each end (of which the Parthenon, the temple of Jupiter Olympius at Athens, and the temple of Diana at Ephesus, are the most famous examples), is only the same idea carried out on a larger scale and with a necessarily greater number of



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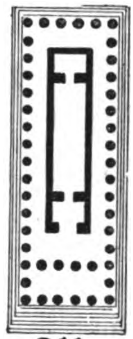
* "Peripteral" signifies with a colonnade all round it.

columns,* because the greater width required more columns to carry the architrave, the space between the columns being limited to that which a single block of stone could bridge. The choice of the Greeks to place their principal colonnades outside instead of inside the temple may have arisen, as has been assumed by some writers, from previous habits of construction in their buildings for everyday use (for which, however, there is no absolute evidence), or it may have arisen merely from the cheerful æsthetic tendency of the Greek mind, which loved a bright architectural display externally rather than a mystery of half-lighted internal architecture. The plan of one of the Selinonte temples (Fig. 211) shows emphatically this aspect of the Greek temple idea: the small narrow interior *cella* (the Egyptian element in the plan) surrounded by and half lost amidst the array of exterior columns.


211.

The Doric temple at Corinth and the older ones at Selinonte and Pæstum (the latter site also a depôt of early Doric work) may date collectively somewhere about 500 to 600 B.C.; that at Corinth perhaps earlier. The culminating period of Greek architecture, represented in the group of buildings on the Acropolis at Athens, belongs to the latter half of the fifth century B.C.; the Parthenon having been completed about 438 B.C. The annexed plan of the Acropolis (Fig. 212) shows the positions of this historic

* Hence the reason for thinking that the octastyle temple at Selinonte, mentioned just now (page 226), is later than the other remains there; it is a further and more elaborate development of the peripteral plan.

group of buildings, including that of the temple (D) which formerly occupied nearly the site of the Erechtheion, and

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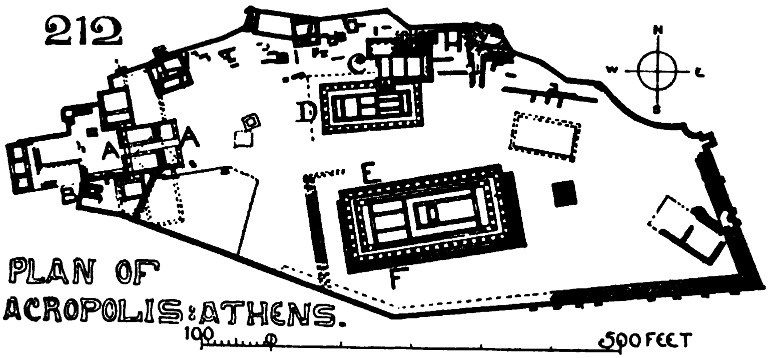
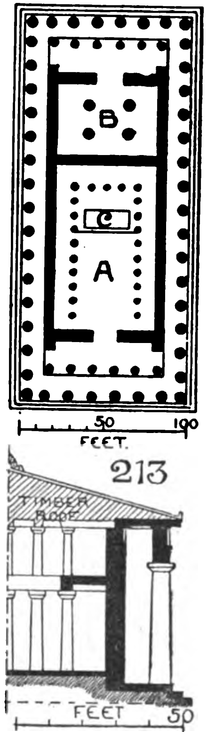


A: PROPYLÆA. B: TEMPLE OF NIKÈ APTEROS. C: ERECHTHEION.
D: OLD TEMPLE OF ATHENE. E: PARTHENON.
F: FOUNDATION OF PARTHENON COMMENCED BY CIMON.

which used to be called the old temple of Athene, but which in all probability included the older shrine of Erechtheus also. This plan may be compared with that of the Persepolis platform (Fig. 202) which was almost exactly contemporaneous with it. It is curious to notice on the artificial platform at Persepolis the precise parallelism of all the buildings, on the natural platform at Athens their apparently capricious avoidance of parallelism; but this may have been because the buildings on the Acropolis were all temples, and as such aligned in reference to certain significant stars; it has even been suggested, and not unreasonably, that the slight difference between the line of the old temple and the Parthenon (seen on the plan, Fig. 212), arose from the change in the position of rising ("amplitude," in astronomical phrase) of a star, between the dates of founding of the two temples. The principal buildings of the great period are the Parthenon itself; the Propylæa, a Doric

gate-screen built a few years later; the Erechtheion, a miniature temple in three divisions dedicated to different deities; and, just outside the Propylæa, the little temple of Niké Apteros, also set askew to the gateway for probably a similar reason to that already mentioned. Outside the Acropolis but near to it was the Doric temple long called the Theseion, but now recognised as the temple of Hephaistos, the best preserved Doric temple that is left to us, of about the same date as the Parthenon.



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In the plan of the Parthenon, shown here (Fig. 213) according to Dr. Dörpfeld's restoration, and with a half section to twice the scale of the plan, the longer compartment (the "Hecatompedon," or hundred-foot temple) was devoted to the worship of Athene, whose colossal statue of gold and ivory stood at the inner end; the smaller compartment at the west end has had various purposes assigned to it, the latest theory (that of Dr. Furtwängler) being that it was dedicated to the worship of certain virgin goddesses (παρθένοι) who had been formerly worshipped in the old temple, and that from them, and not from Athene, it was called the "Parthenon." Architecturally its main points are the refined finish of all the details, including the curves for optical correction already described in Chapter II.; the sculptured subjects in the two pediments, the surviving portions of which are now in the British

Museum; the sculptures in the metopes, and the beautiful frieze in low relief placed, oddly enough, at the point marked F on the section (Fig. 213), where it was completely in shadow and otherwise in an impossible position for being properly seen, though very well placed for decorative effect architecturally. There is no doubt that this frieze was brought out by colour and gilding, traces of which have even been found upon it; and proof has been found, in this and other Greek buildings, that the mouldings and other portions of the surface were relieved by painted decoration somewhat in the manner indicated in Plate VII., in which also a sketch of the whole building is given. It seems probable, however, that such colouring must have been applied without entirely concealing the surface of the marble.

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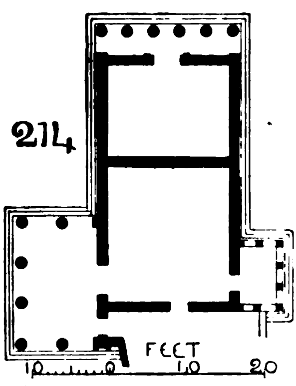


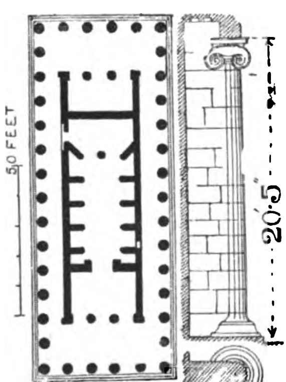
The Erechtheion, of which a sketch is also given on Plate VII., and the plan of which (Fig. 214) is annexed, as far as the outer walls are concerned (the internal arrangement is matter of dispute) is a remarkable and unique instance, as far as we know, of the unsymmetrical combination of three temples in one building; showing that Greek architecture is susceptible of complete freedom of treatment in this sense, without losing its characteristic qualities of finish and refinement of detail. The celebrated south porch, the entablature of which is carried by six draped female figures in place of columns, is the only instance we know of, in the Greek art of the best period, of the human figure being thus used as an architectural

member; and though the statues are beautifully treated for the purpose, showing a combination of architectural conventionalism of drapery and pose along with just sufficient difference of detail to give a sculpturesque individuality to each, yet on the whole we may be glad that the example is unique, and that the Greeks, though they showed their usual refinement of æsthetic perception in their treatment of these figure-columns, did not allow themselves in general to be drawn into this questionable use of the figure as a constructional element in architecture. The sculptured figure is the finest possible decorative adjunct to architecture; but to use it as an architectural support is to travel out of the realm of purely architectural design, and to degrade the figure, the highest medium of expression in art, into a piece of architectural mechanism.

The next most important site of ancient Greek architecture, after the Acropolis at Athens, was perhaps the *altis* or sacred enclosure at Olympia, the excavation and elucidation of which we owe to the German archæologists, and especially to Dr. Dörpfeld, who may be said to have made the site his own. Here there was a hexastyle Doric temple of Zeus, a good deal earlier than the Parthenon (470 B.C.), and which was built not like the latter, of marble, but of *poros* stone overlaid with stucco, in which manner also the internal architecture of many of the Egyptian temples was finished; so that stucco mouldings are not quite such a modern barbarism as is sometimes supposed. Here also was the Heraion, or temple of Here, a structure of much older foundation than the Zeus temple, and of interest as connecting us with the more ancient timber architecture from which the Doric style was partially at least derived; its columns were much more widely spaced than usual in the complete

Doric, and probably bore a wooden entablature,* and it has been suggested that the columns themselves were originally of wood and only gradually replaced with stone ones, as Pausanias mentions that in his time (second century A.D.) there was a wooden column remaining, apparently in the opisthodomus, or apartment in the rear of the main temple. This, however, may have been a special treatment of an interior column; at all events the remark of Pausanias is much too vague to afford a basis for the conclusion that the Doric column was originally a wooden feature; a conclusion with which its design, proportion, and detail are entirely at variance.

The capability of variety in Greek architecture, in spite of its severe style, which is implied by the Erechtheion, is illustrated in other monuments, early and late. It was by no means *de rigueur* that the same style or "order" should be used internally and externally: thus in the small temple of Apollo at Phigaleia the external order is Doric, the internal order Ionic, and both plan and interior order are treated in a manner quite differing from that of any other Greek temple we know of. In the plan (Fig. 215) the interior order was connected with the wall so as to form a series of solid internal buttresses, and a half-column of the Ionic order worked on the inner face of these buttresses, the Ionic cap, however, being complete and carried back above part of the side of



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* An interesting pictorial representation of this combination of stone columns with a timber entablature may be seen in the representation of the temple of Æsculapius in Mr. Poynter's fine picture,

the buttress, as shown in the sketch. Generally speaking it would seem that where different orders were employed the sterner and simpler one was used externally, the more ornate one internally; thus, at Ephesus, where the temple was Ionic in its external order, a Corinthian capital of smaller scale was found, probably belonging to the internal architectural decoration of the temple. This celebrated temple of Diana at Ephesus, the remains of which were discovered a few years ago by the energy and perseverance of the late Mr. Wood, furnishes another example of the variety of treatment in Greek architecture. A century later than the Parthenon, on a much larger scale, and built on Asiatic soil, it represented the Greek idea carried out with an Asiatic magnificence, the lower portions of the exterior columns being decorated with three tiers of sculpture, above which rose the usual fluted shaft terminating in those massive Ionic capitals, the fragments of which in the British Museum strike the spectator with astonishment at the scale and boldness of the work.

Among the more remarkable monuments of Greek architecture which present special interest, may be named the Mausoleum at Halicarnassus, of which the remains were found by Sir Charles Newton, and restorations of which have been attempted, on the basis of these remains (now in the British Museum) and of Pliny's description; but without much success. It is certain, however, that the Mausoleum was an erection of a different type from the Greek temple, which is commonly regarded as the sole type of Greek architecture, and it is pretty certain that it had a pyramidal roof, probably in steps, with a chariot group at the apex; and it may be observed that the pyramidal

"A Visit to Æsculapius," among the "Chantrey Bequest" pictures at South Kensington.

termination seems, from other remains or indications, to have been associated in Greek architecture with tumular or monumental erections. Another remarkable building of unique type (as far as we know) in Greek architecture, was that called the Thersilion, at the back of the stage of the great theatre at Megalopolis, only recently discovered. The plan of this building (about 370 B.C.) was a square, the area of which was planted with parallel rows of columns, one within the other, carried completely round three sides; but instead of the columns being spaced opposite to each other, they were placed so as to fall in radiating lines from the centre of the fourth side, evidently for the purpose of interfering as little as possible with the sight and hearing of what went on at the part of the interior towards which the attention of the assembly was directed. There is no other example known, as far as I remember, of a building planned in this particular way; and it is important, as showing how erroneous is the popular idea as to the uniformity of plan and arrangement of Greek buildings.

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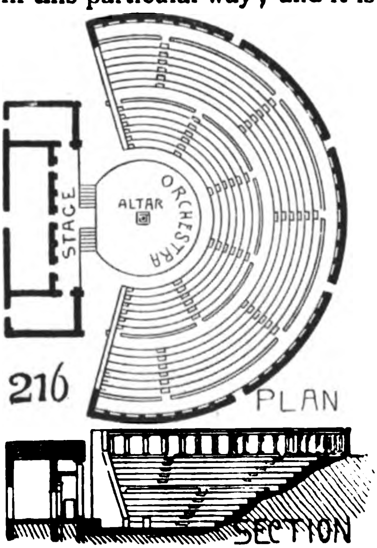
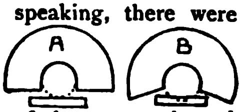


The Greek theatre claims a word, though it was scarcely a building in the usual sense, as the Greeks adopted the very practical principle (for their climate) of selecting for their open-air theatres sites which, with a little manipulation of the ground when necessary, provided the general section required for the auditorium—that of a concave

slope, which only needed to be laid out with rows of concentric stone seats, one above the other; sometimes, though not always, with a colonnaded gallery running round the upper circle. A plan and section of a typical Greek theatre is given in Fig. 216;* the chorus sang and went through their evolutions in the central space (the orchestra); the principal actors appeared on the narrow stage stretching across the base of the auditorium,† which was accessible from the orchestra by steps (the arrangement of which seems to have varied a good deal), and was backed by a permanent architectural scene, of which, however, no example remains. It would probably consist of a colonnade in one of the three orders of Greek architecture, forming a screen to the wall through the doors in which the principal actors entered; or the order may have been, as in a part of the Erechtheion temple, attached to the wall as a mere decoration, though this use of the order was not very common with the Greeks.

Of the Greek house of the classic period no example remains; what we know of it is chiefly through the remains



* Strictly speaking, there were two forms of Greek theatre plan, one (A) in which the auditorium seats were prolonged in a straight line from the limit of the semicircle, and finished parallel with the front of the stage; the other (B) in which the curve of the seats was continued beyond the semicircle, and they finished at an oblique angle with the stage. The latter is, however, the more distinctly Greek plan. The Roman theatre plan resembles type A, but with a wider and deeper stage.

† Dr. Dörpfeld has adopted the theory, for reasons which we cannot go into here, that the Greek theatre had no stage, and that the principals acted with the chorus in the orchestra; but so far no confirmation of his theory has been discovered in any Greek theatre remains, and it seems inherently improbable, besides being contrary to the testimony of Vitruvius, which, though not of absolute authority, must have considerable weight.

of Roman houses (especially at Pompeii) coupled with the description of Vitruvius, and it may better therefore be touched upon in connection with Roman work.

That Greek architecture can hardly have been said to have attained sublimity of expression, at least in those buildings of which sufficient remains are left standing to enable us to judge of their effect, is mainly owing to the comparatively small scale of the buildings. As it is, the Parthenon, though it is only the length of a large parish church, is a far more impressive and grand-looking structure, even in ruin, than any mediæval building of the same size; and could we imagine it carried out on double the scale, with columns between sixty and seventy feet in height, there would have been few buildings in the world of more monumental grandeur. This grandeur of effect in comparison with its scale is partly due to the broad and stern simplicity of the Doric style; and though the great Ionic temple of Diana at Ephesus was one-third larger, and far richer in decorative treatment, and was scheduled as one of "the seven wonders of the world," it may be questioned whether its size would have given it much advantage over the more severe and at the same time highly finished style of the Parthenon. In comparing Greek with Gothic architecture, we must recognise also the superior effect of repose and duration, conveyed by the lintel as compared with the arched method of construction, in buildings of the same size. Nevertheless it must be admitted that sublimity is not the special "note" of Greek architecture. For the effect of sublimity we require either great length or great height. The Egyptian temple, in its largest examples, though not sublime externally (except perhaps in the effect of its avenues of sphinxes leading up

to the entrance) was one of the most impressive of all architectural creations internally, from its massiveness, its long vistas, its mystery of gloom, and the wonderfully effective manner in which its hypostyle halls were designed and lighted. The greatest productions of mediæval architecture, as well as the greatest domed structures of the world (*e.g.*, the Pantheon, St. Sophia, and St. Peter's), are sublime from their soaring effect of height, internally or externally, or both. Greek architecture, on the other hand, strikes one as being strictly limited in its expression; it has no suggestion of the infinite; it represents not so much the poetic as the intellectual phase of architecture. But as such it is supreme; as an example of the expression of thought and culture in tectonic form it remains unapproachable; it is an architecture in which every detail seems to be thought out with the object of rendering it perfect; in which nothing is slurred over or treated carelessly, from the general setting out of the whole building down to the contour of the smallest moulding. There has been nothing else like this in the whole history of the art; other styles may show us grander and more striking buildings, but all other architectural detail appears coarse after a continuous study of Greek work.

As has been already observed, the influence of Greek architecture on the subsequent styles of the world, though in an indirect sense great and enduring, was so mainly through the medium of the Romans. In spite of her intellectual greatness, Greece as a state (or a collection of states) was politically too short-lived and too restricted in power and influence to impose her architectural taste directly on the world to any great extent. The conquests of Alexander probably for a time carried some influence

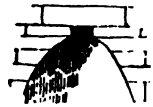
from Greek taste and Greek detail into the north of India, and incidents are found in early remains of Indian architecture which are distinctly classical in origin; occasionally bits of ornament or of moulding have been come across which seem to have been directly derived from Greek work; others, such as the remains of a temple at Martand in Kashmir, seem to be rather Roman or Byzantine than Greek in origin. In any case, there is no record of anything like a spread of the Greek style into India; only an occasional Greek influence traceable in details. The Ptolemaic rule in Egypt, however, had a distinct effect on Egyptian architecture, which opens a new chapter here. It is curiously characteristic of the traditional conservatism of Egyptian art, that the Greek invasion had no power to change the main form of the plan of the Egyptian temple, or to supersede the old characteristic details. In the principal temple at Philæ we have the pyramidal-shaped pylons still; at Denderah the old Egyptian crown-moulding still remains, unaltered after nearly two thousand years. Only in the front at Denderah we have (see Plate VII.) something more like the Greek colonnade, though represented in a peculiarly Egyptian form, in the columns with human-headed capitals, and with a screen interposed between for half their height; the screen again, however, finished with the Egyptian hollow crown-moulding. In the well-known smaller temple or hall at Philæ we have something like a Greek peripteral temple in general idea, but the details are all purely Egyptian. This was all the effect which the Greek conqueror could produce on the time-honoured Egyptian forms of architecture: essentially they remained Egyptian still. A sketch of the human-headed capital is given on Plate VII.,

and also a modified form of the lotus capital, which is evidently a suggestion from the Greek Corinthian capital, but still with the general appearance and outline of the Egyptian lotus capital. It has become a commonplace recently, in books on architecture, to speak of these as the manifest origin of the Corinthian capital. Seeing that the capital of the Monument of Lysicrates (page 68) was in existence a century earlier at least, this is a very inverted reasoning.*

Roman architecture, as already observed, is in its main characteristics and details merely Greek architecture imitated with greater richness and less refinement of detail. Of the earlier antecedents of Roman architecture on the soil of Italy itself little is known. The ground was occupied apparently by the Etruscans—"Asiatics transported to the shores of Italy," as Texier calls them; possibly from

* A similar archæological inversion has been popularised by Fergusson, and copied by every subsequent writer from him, in regard to a small class of Egyptian temples called "Mammeisi," which are peripteral in plan, and are roundly asserted to be the origin or model of the Greek peripteral temple. Of these there is one at Philæ, and another at Denderah; both of Ptolemaic date, and therefore centuries later than the earliest Greek peripteral temple. Besides these, I am aware of no other Mammeisi temple except one which did exist at Elephantine, which has never been known in a complete stage to modern archæologists; the remains of which were destroyed early in the present century; and the restoration of which is doubtful. Fergusson's argument is based merely on a restoration of this temple by Wilkinson, copied at second hand. Wherefore I am inclined to think that the idea of the Mammeisi temples having suggested the Greek peripteral temple is a mere architectural mare's nest, and that the only two Mammeisi temples now in existence are imitations of the Greek peripteral temple made after the Greek conquest of Egypt. It was necessary to refer to the point, as the theory referred to will be found stated, with the greatest confidence, by every recent writer on architecture, as if it were ascertained fact.

Asia Minor. They used the horizontal-jointed false arch,



as found at Cervetri; but appear also to have been acquainted with the use of the true arch with radiating joints.* Some other rock-cut tombs at Norcia show a pediment and triglyphs, recalling the rock-cut façades of Asia Minor; on the other

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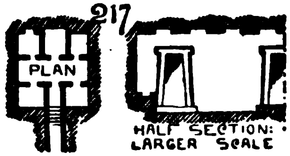

hand, the tomb at Cervetri, of which a plan and half section are given in Fig. 217, in its range of three cells at the back, and in the sloping lines of their doorways, reminds us rather of Egypt. The accompanying profiles of some Etruscan mouldings (Fig. 218) show a

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kind of distant but obvious relationship with Greek types of moulding. Of large buildings of any kind there are no remains. The most distinctly marked tendency of the Etruscans in building, of which

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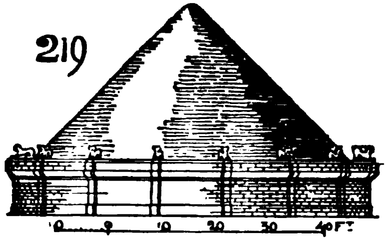
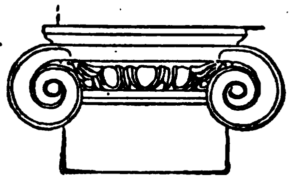


we find evidence remaining, was towards the erection of circular tombs, of which the typical form was that shown in Fig. 219; a drum-shaped base with a cone rising from it. That form of Etruscan erection alone seems

* Generally speaking, during that period of architectural history in which the true and the false arch were used simultaneously, it would seem that the false or horizontal-jointed arch was preferred when the arch was to be a pointed one; the radiating form when a round arch was built. This is only natural, as it is much easier to build a horizontal-jointed arch in the pointed form than in the round form, for which the stones must overhang very much, and be much cut away in the upper part of the arch.

to have had some influence on the Romans, among whom a certain evident taste for circular buildings was probably derived from their predecessors on the soil; and the tomb of Cecilia Metella and the mausoleum of Hadrian (now called the Castle of St. Angelo) are probably architectural descendants of the Etruscan circular tomb.*

The difference between the Greek classic orders and the Roman versions (or perversions) of them lay generally in a greatly added richness of ornamentation, accompanied by a want of delicacy and refinement in the profiles of the mouldings, and of that exquisite sense of proportion which pervades all Greek work. The Ionic order they did not alter very materially, except in their treatment of the capital with poor, starved-looking volutes, and hard straight lines connecting them, instead of the fine roll and sweep of line in the Grecian capital, as will be seen in comparing the capital of the Theatre of Marcellus (Fig. 220) with the Greek Ionic capital given in Fig. 61 (page 67).



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What the Romans (according to Vitruvius) called the Doric order (Fig. 221) had no resemblance to the Greek Doric, the austere style and restrained detail of which could not have recommended itself to the meretricious taste of the Romans. Their misuse of the triglyph in taking it away from the angle

* The present fortress-like appearance of the circular portion of the Castle of St. Angelo is only its mediæval mask; originally it was adorned with a classic order of pilasters. Byron, when he spoke of Hadrian as—

"Imperial mimic of great Egypt's piles,
Colossal copyist of deformity,"

was misled by the modern aspect of the building; it was a perfectly classical-looking structure originally.

of the building has been already pointed out (page 61). The Corinthian order was the Roman order *par excellence*; the finest examples of the Corinthian capital, though the idea of it was derived from the Greeks, are superior in richness of effect, and in a certain completeness and unity of design, to any of the few purely Greek examples; and this richness of treatment of the capital

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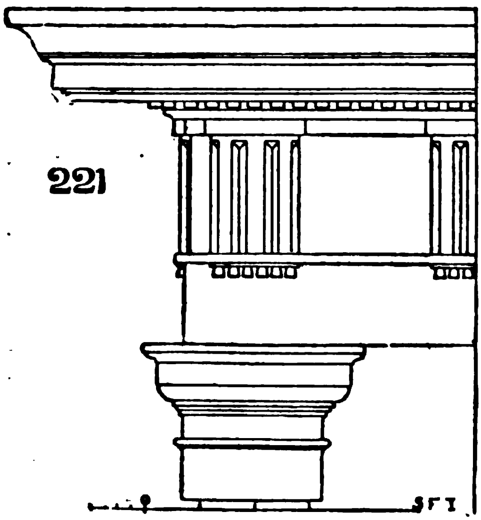
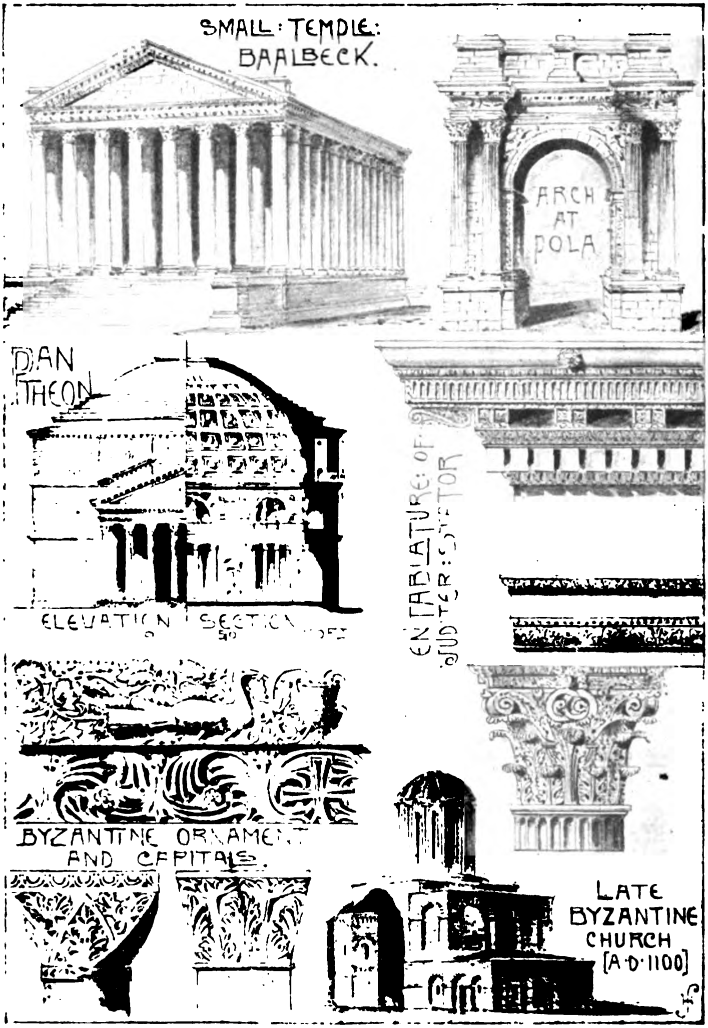


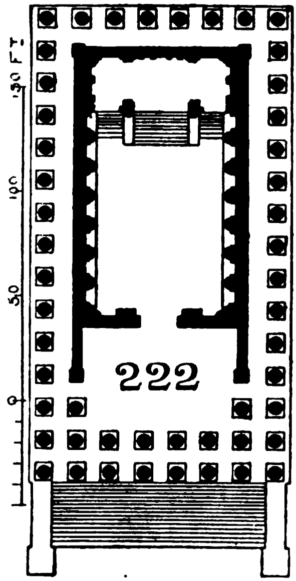
gave excuse and fitness to the lavish decoration of the entablature, as shown in the instance of the "Jupiter Stator" temple* given in Plate VIII. Here the Roman architect is seen at his best. Refinement was beyond him, but sumptuous effect was within his possibilities. In the general treatment of the peristylar temple we see the same characteristics. The buildings are sumptuously ornamented, but have an expression of commonplace design which distinguishes them at once from a Greek building; the slope of the pediment is generally a good deal steeper; the columns are often unfluted, which

* This is the example preserved in the three columns which stand in a line at the end of the Forum at Rome, and which were long supposed to be the remains of the temple of Jupiter Stator: they are now assigned to that of Castor and Pollux.



ROMAN AND BYZANTINE.

detracts very much from their expression; when fluted, on the other hand, the channels are deeper and narrower, and less carefully profiled, than in Greek columns. The curves in the sections of mouldings are always circles or parts of circles, such as could be struck with a compass; which, as already mentioned, is scarcely ever the case in Greek mouldings. The temple at Baalbek, of which a restored view is given on Plate VIII., and the plan in Fig. 222, may serve as a typical example. In the entablature the Romans played many vagaries; making the frieze of a convex section sometimes ("pulvinated": A, Fig. 223); sloping the face of the architrave outwards, as at B. They invented also the device of mounting the column upon a pedestal, probably in the first instance for the purpose of getting the capital to a greater height, where desired, without altering the proportions of the column; but it became a kind of trick of the style.



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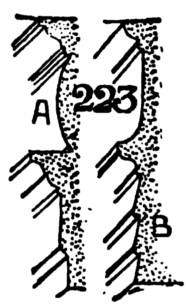

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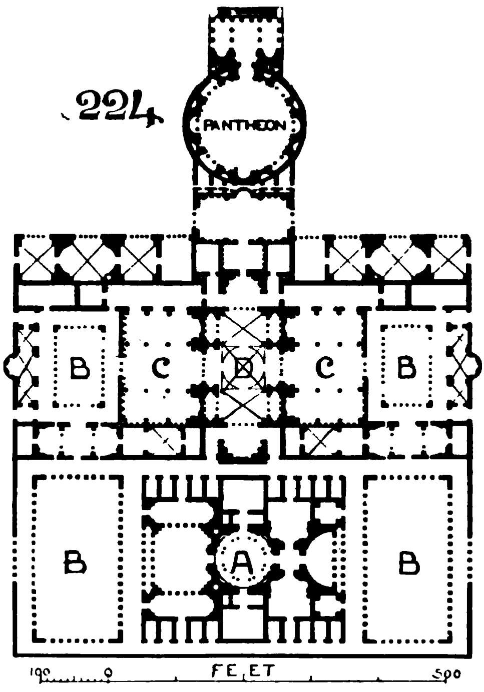
What the Romans lost in refinement, as compared with the Greeks, they may be said, however, to have made up for in the size and multiplicity of their buildings. The contrast in this respect is very striking. Greek architecture, the work of a small society of highly cultivated

artists, is represented by temples mostly of moderate size, but exquisite finish, by theatres formed on the slope of the ground, and with little architectural treatment except in the built background of the stage, and by a few monuments of which remains are left, and each of which exhibits a very marked individuality of treatment. The Romans, on the contrary, represent an immense empire, which dominated the whole then known world in a manner of which there is no other example in history, and confront us with an array of structures of which the temples form but a small proportion. They were greatest in civic and engineering buildings; and the very name of Rome, in this connection, conjures up a vision of immense palaces, of two and three-storied aqueducts, of vaulted basilicas, of triumphal arches, of built-up amphitheatres on a great scale, the Colosseum as the gigantic centre of the group, and of enormous baths which seemed almost like small cities in themselves.

224.



A: LACONICUM. C: PISCINÆ.
B: PERISTYLES. D: TEPIDARIUM.

These last were among the most characteristic buildings of the Romans, and included, besides the actual baths, which occupied but a small portion of the plan, great halls for lounging or exercise, corridors and gardens adjoining. The plan of the baths commenced by Agrippa B.C. 21, and enlarged by some of his successors, is given in Fig. 224.* Those of Caracalla, however, were far beyond these in extent. None of these buildings are now in a condition that would enable us to make out much of their architectural treatment, but they were drawn by Palladio and others when there was more of them remaining than now. The kind of architectural treatment externally was probably something like that shown in Fig. 225, and here we see for the first time that use of columnar architecture as an ornamental feature in one story of the design, instead of forming the complete order of the building, which is one of the greatest distinctions between post-Roman architecture and Greek. In all columnar architecture of the true antique type, Egyptian or Greek, the column was, so to speak, the measure of the height of the

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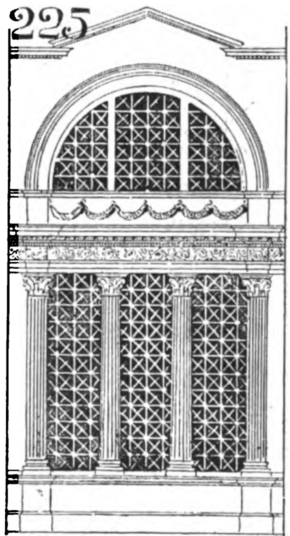
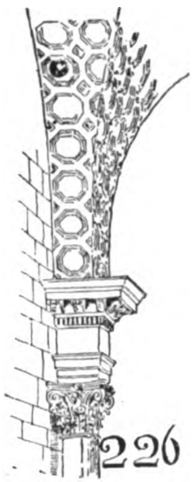


* From the combined restoration, partly from Palladio and partly from Canina, given by Professor Aitchison in connection with his lectures on Roman architecture. The plan of the Pantheon is retained to show its close proximity and central position in relation to the baths, which led to the supposition that it was originally built as the "Laconicum" or entrance-hall of the baths. Recent discoveries have shown that it was built long after the latter (see page 255).

building, which was proportioned to it; in late Roman work the column began to be used independently of the scale of the building, with very important results on the architecture of later times. Internally, in the large halls, the order was still proportioned to the height of the interior, and was used, as shown in Fig. 226, as the apparent support to a vault, which sprang from the slice of frieze and cornice balanced on the top of the capital (see page 77). This arrangement of a column and piece of entablature supporting the centre vault, with arched recesses on each side of the column, is one of the most strongly marked characteristics of Roman architecture. The column is in reality hardly more than an ornament; the real vault construction was of concrete, faced with brick, and incorporated with the main wall at the springing of the vault; the vaulting surface was covered with marble veneering; and after the brick vault had thoroughly set, the column might have been taken away, in most cases, without disturbing the construction. This system of brick and concrete construction with a mere veneer of marble or stone is a marked peculiarity of Roman work in Rome and its neighbourhood, where the *pozzolana* earth which abounds in the district served especially well, mixed with lime, for the manufacture of an enduring concrete.*



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* Concrete, of which there are various forms, is essentially a collocation of small stones or other small material in a bed or matrix of cementing material. In England in the present day it is mostly made with hard angular gravel and Portland cement.

The very earliest Roman remains—portions of the walls of the ancient city—are built with solid tufa masonry; but during the whole period when Rome was architecturally important, the main portion of the walls, vaults, and foundations were of concrete, often of enormous thickness, cased in the earlier period with brick or stone, but at, and subsequent to, the date of Augustus generally with marble. The Pantheon dome is in fact a pile of bricks and concrete, exercising none of the thrust of an arch (see pages 85-92), but with relieving arches to throw the weight on the piers below. It is curious that after the time when the Romans began to case their important buildings with marble, they still continued to face the concrete with brick as before, though this was not only unnecessary, but was an additional difficulty in the way of fixing the marble veneer. This latter, being fixed on with metal cramps, has in most cases either fallen off through the decay of the metal, or been removed by pillage, leaving only the brick-covered masses of concrete, which give us an idea of the solid construction of the buildings, but not of their architectural appearance. As Clough says in "Amours de Voyage":

> "Brickwork I found thee, and marble I left thee!" their Emperor vaunted.
> "Marble I thought thee, and brickwork I find thee!" the tourist may answer.

The distinctions between the Greek and Roman styles in the details, mouldings, and decoration of columnar architecture, already referred to, are, after all, not so great as in themselves to break the continuity between Roman architecture and its Greek original. It is still the same architectural ordonnance, modified in detail and treated

with less refinement; and wherever the Romans wished to produce a decorative architectural effect they used these same quasi-Greek materials. The radical distinction between Greek and Roman architecture is to be looked for in the general scale and treatment of Roman buildings, more than in their details. It is a State and Municipal architecture rather than a temple architecture. As the area of the Acropolis was the architectural centre of Greece, so that of the Forum and its immediate surroundings was the architectural centre of Rome. But here the temple is not, as on the Acropolis, the leading and central feature. There were temples around and abutting on the Forum area; but the Basilica Julia, the great public hall, occupied a far larger area than any of the temples; the triumphal arches of Septimius Severus and Titus were conspicuous in the group, and in the immediate vicinity the enormous amphitheatre dominated everything else. The Colosseum illustrates the radical distinction between the construction of the Greek and Roman theatre. In the former, as already noticed, the rising concentric rows of seats for the audience were formed on the slope of the natural ground; a method practical and economical, but in an architectural sense somewhat timid. Economy was no vice of the Roman architect, and he built his auditorium boldly up from the ground, the exterior of it being faced by a great vertical wall, and the space below the built-up seating utilised in the working of the theatre and for storage. In the Roman theatre (as distinguished from amphitheatre), the same system of building-up was usually observed; and while the general arrangement of the interior was much the same as in the Greek theatre, except that the Roman

stage was a good deal deeper and longer (to allow for the greater complication of the Roman drama and the larger number of actors employed), externally it was a great building with lofty containing walls. To relieve these walls from bareness they were decorated, as shown in the sketch of a portion of the Colosseum on page 78, with columns and entablatures of the Romano-Greek model, not supporting anything, but simply *applied* to the wall as decoration; and it is here, in this decoration of the exterior wall of the Roman theatre, that we get the principal suggestion of the system of using columns and shafts as wall-decorations, which had such an immense influence on subsequent architecture, not only on that of the Renaissance period, when classic forms of architecture were revived, but on mediæval architecture also; for the use of different stages of arches and wall-arcading in mediæval buildings is a modification of this Roman practice of using columnar orders one over the other as ornaments.

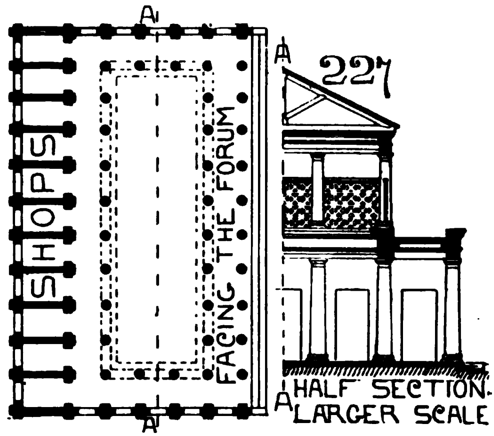
Among the other classes of Roman structures already alluded to, the aqueducts, although they appear now to us, in their time-worn state, as among the most picturesque and striking building remains of antiquity, were in reality purely engineering works, and in these, as was remarked in Part I. (page 78), the Romans had the good sense to omit any pretence of columnar decoration, and to treat the structure as what it was—a set of tiers of arcades to carry a water-conduit, for supply by gravitation, at a high level. The triumphal arches, another important and characteristic class of Roman works, are, on the other hand, purely æsthetic productions, with no practical purpose at all; they were merely records of the ostentation

of this or that emperor, or (more frequently) of the triumph of the Roman arms. The general design of them all is much the same in essentials; a large and deep semicircular-headed archway, flanked by either one or two columns (usually two) at each side of the arch, generally standing well clear of the masonry which forms the pier of the arch, and carrying the usual entablature over it, surmounted by an attic.* Outline elevations of triumphal arches of the Roman type were given on page 32, in illustration of the question of proportion; the arch at Pola, of which a sketch is given on Plate VIII., may be taken as a typical example of this class of structure, not so familiar in illustrations as those at Rome.

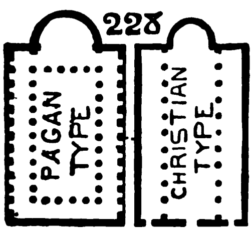
The Basilica was a type of building of which no remains exist except in a very fragmentary state, but of the plan and construction of which we have a pretty complete idea from the description of Vitruvius, coupled with these remains and some indications in the Capitoline plan of Rome. It was really an Exchange, a meeting-place of merchants, a columned structure roofed in, but open all round. Vitruvius states that it should be situated "adjoining the Forum, on the warmest side, so that the merchants may assemble there in winter, without being inconvenienced by the cold"; and in fact the Basilica Julia did occupy nearly the whole of the south-west side of the Forum at Rome, though one could perhaps hardly call this the warmest side, since it faces north-east towards the

* The "Attic"—a word which has now in this country passed into colloquial use for the topmost floor in a house—is properly, in architectural parlance, a story added, above the cornice, to an Order which is already complete without it; and in this use it refers only to the architectural composition, without consideration whether there is a floor or not.

open area of the Forum. The normal basilica plan seems to have been derived from that of the Greek temple, with a colonnade in place of the solid wall of the *cella*, and with a double tier of columns in the inner colonnade, as in many of the Greek temples; but it differed from the Greek temple in section, as the lower columns were all of the same height, and the roof was in two heights, as shown in the typical plan and section, Fig. 227. The chief historical interest of the Roman basilica lies in the fact that in it we have evidently the germ of the section of the mediæval church, the high central nave and low aisles. It was until recently the common teaching of architectural historians that the basilica was in every respect the origin of the plan also of the Western form of Christian church, and even that the earliest Christian churches were in fact Pagan basilicas converted to this purpose. The fact that some Roman basilicas are known to have had an apse at one end seemed to give colour to this idea; but in fact the apse was no essential feature of the Pagan basilica, and is not mentioned by Vitruvius; and even where it existed the colonnade was often returned across it, which is quite out of keeping with the idea of the church plan, in which the

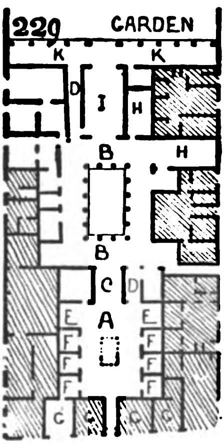


apse was the central feature to which the whole interior led up, and was to be in view of the whole congregation.



The difference will be seen in the comparative plans of a Pagan and Christian basilica with an apse, Fig. 228. In the former the apse, where it existed, was for a tribunal for hearing cases, but what went on there was only of interest to those immediately concerned, not to the general crowd in the building. The question of the real origin of the plan of the Western Christian church we shall have to refer to again just now.

In regard to the Roman House we are more fortunate than in regard to the Greek, as we have the remains at Pompeii to assist us in understanding the description by



A, Atrium; B, Peristyle; C, Tablinum; D, Fauces; E, Alæ; F, Cubicula; H, Triclinium; I, Œcus; K, Crypto-porticus.

Vitruvius. The same writer gives us the description of the Greek house and its points of difference from the Roman, which, however, is not in all respects intelligible, and it is doubtful if Vitruvius had ever been in a Greek house. But there can be little doubt that the ordinary Roman house, as represented at Pompeii, was very much on the same general lines as the Greek house of the classic period. We cannot here go into details as to the arrangement of the Roman house; but, taking the house of Pansa at Pompeii (Fig. 229) as a typical example, it is important to note the atrium or fore-

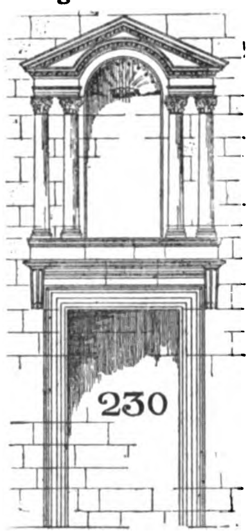
court to the house, and the peristyle or colonnaded room beyond—an architectural incident which we shall have to refer to again. The palaces of some of the later emperors, and the houses of wealthy Romans built after their own fancies (such as Pliny's villa), were apparently of the greatest elaboration and magnificence; but their real plans and arrangements are now only matter for the speculation of the restorer.

Reference has already been made to the tradition in favour of circular structures left in the land by the Etruscans; and the Romans left proof of their inheritance of this tendency in various circular temples; that of Venus at Rome, that of Vesta at Tivoli, but more especially in the Pantheon, which is perhaps the most remarkable production of Roman architecture, not only for its intrinsic grandeur, but because it is the earliest great domed building we know of, and there is in this sense nothing to lead up to it; it springs up suddenly as a domed structure on the largest scale, with no predecessors of any importance in the same manner of building. An elevation and section of it are given on Plate VIII.;* the design is remarkable for its simplicity, and for the impressive manner in which it is lighted from the one great circular opening in the centre of the dome. The dome was originally lined with marble and gilt bronze, and the exterior covered with gilt bronze plates. It was supposed till recently that the Pantheon was built by Agrippa in the year 27 B.C., according to the inscription on the front of the pediment; but the investigations of a young French architect, M. Chedanne, have left little room for doubt (on the evidence especially of the stamps on many of the bricks

* The plan of the Pantheon has been given on page 36 (Fig. 29).

used in it) that the circular portion was really built by Hadrian at the beginning of the second century A.D.; the portico of Agrippa, which gave access to some building preceding the Pantheon, having been taken down and rebuilt on the new level (for there is evidence that the floor level was altered) at the same time. Hadrian's *penchant* for great circular buildings, displayed in his mausoleum, renders this all the more probable.

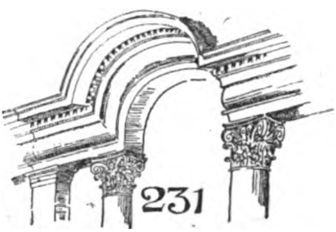
To realise fully the immense architectural influence of Rome on the world it must be remembered that for more than four centuries, say from 100 B.C. to 330 A.D. (the founding of Byzantium), Rome was *everywhere*. Her triumphal arches mark the memory of her conquests in Africa as well as over great part of Europe; her long straight roads traverse our own country; her great aqueducts for water traversed Spain and France as well as Italy; her temples were all over the then known world, always maintaining on foreign soil the Roman style of architecture—



> And Tadmor thus and Syrian Baalbek rose,

as Heber puts it; and the influence of Roman architecture is even perceptible for some distance into India, in the shape of comparatively rude versions of Roman detail by Indian builders. In the later Roman work we begin to find suggestions of the relaxation of the strict rule of classic columnar architecture. In the remains at Baalbek, for instance, about the end of the second century, we find

this kind of arrangement of doorway and niche over it, flanked by small columns (Fig. 230), which is quite alien from the spirit of classic architecture as understood by the Greeks. In Diocletian's palace at Spalato,* at the end of the third century, we find a most significant indication that the arch is about to oust the entablature, in the fact that the whole entablature—cornice, frieze, and architrave—is here (Fig. 231) diverted from its proper function as the expression of trabeated construction and turned bodily round the circumference of the arch; a piece of illogicality which was fraught with possibilities of future development. The plan of the palace of Spalato, almost a small town in itself, may be added here (Fig. 232) as the best attested example of the immense extent and scale of some of the Roman imperial palaces.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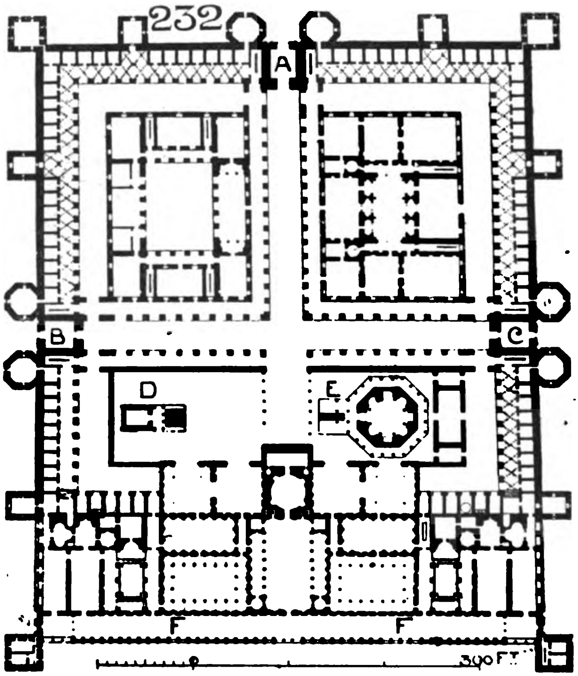
We must now quit for a time the further development of Western architecture from the point where the Romans left it, to notice the new departure which took place when the seat of empire was transferred in the fourth century to Byzantium. Throughout the mediæval period, down to the fifteenth century, the great works of architecture were the churches, and from Rome and Byzantium respectively originated the two great types of church; the long Basilica plan (the Latin type of church) from Rome, the square domed plan (the Greek type) from Byzantium. The influence of the former was by far the greatest in

* Often wrongly called "Spalatro." "Spalato" is obviously only the corruption of the Latin *palatium*; the *r* has no place in it.

western Europe; nevertheless the Byzantine type was to penetrate into some parts of western Europe in the shape



of some very remarkable buildings, while in its own birthplace it is represented by one of the greatest buildings in the world, the church (now a mosque) of St. Sophia, built by Justinian in the middle of the sixth century. The plan and section of St. Sophia,* Fig. 233, show the main principle of its construction. It is a building in which the dome principle of construction is carried out in its integrity. The central space is roofed over by a great

* The outlying buildings connected with the plan are omitted, as they do not affect the main original design.

dome, which is rather flat in section (less than a semicircle); a section which gives it all the more effect internally, as it is not carried so far away from the eye, and

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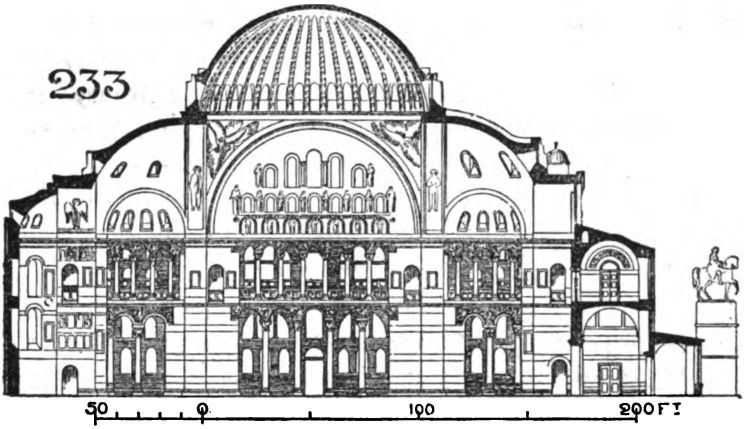

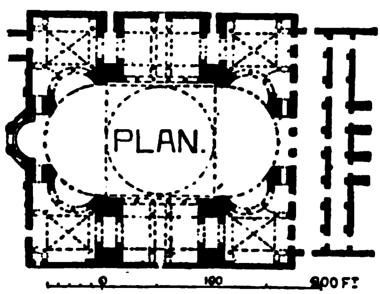

consequently diminished in perspective effect, as is the case with domes which are loftier and narrower in proportion. The end portions of the plan are covered by semi-domes, which abut against and support the lower ring of the central dome, carrying its thrust down at those points, while ample counterforts are provided at the sides of the plan; and the portions of the domes which overhang the angles made by the rectangular walls below are carried by quarter-domes called "pendentives" (see B, Fig. 91, page 95), which effect the transference from the circular to the square form. The effect of the central portion is that of an interior which is entirely domical in

construction. As the Greek temple is the perfect expression of trabeated architecture, and the mediæval cathedral the perfect expression of vaulted architecture, so St. Sophia, internally, is the most perfect and consistent expression of domical architecture. Externally, it must be admitted, the building has little beauty, in fact there is little attempt to treat it architecturally in the higher sense; the object seems to have been to produce a magnificent interior, the exterior being merely left to get what impressiveness it could have from the masses of wall employed as counterforts to the dome.

The grandeur of this interior may be regarded as to some extent due to the special genius of Justinian's architect; still it is not, like the Pantheon, an apparently new conception with no direct predecessors; it is only the finest development of an architectural style which had been gradually shaping itself out of previous materials. When Constantine first transferred the seat of empire to Byzantium, it is not surprising to find that the earliest Byzantine churches retain the Basilica form of plan, the long chamber with an apse at one end, the taste for which had been transferred from Rome to the new site; and Texier* gives an instance of the temple

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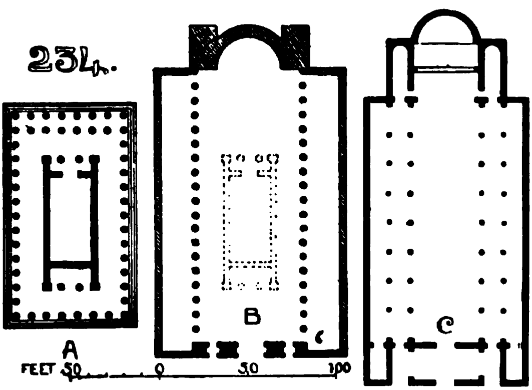

* "Byzantine Architecture."

of Venus at Aphrodisias, in Caria, having been converted into a Christian church, apparently somewhere between the time of Constantine and Theodosius, by surrounding it with walls and putting an apse at one end (Fig. 234).* The new position of the seat of empire, however, brought the Imperial rulers and their architects into touch with Asia Minor and Mesopotamia, and the influence of the East soon made itself felt in the modifications of classic ornament and leafage which were seen in capitals and friezes (see early Byzantine ornament shown in Plate VIII.), while the Christian creed gave rise to the frequent employment of the symbolical vine-leaf in ornament. The influence of Christianity, coupled with the desire to embellish the new capital and its dependencies with churches as soon as possible, also led to the frequent pillage of the remains of Pagan temples, the columns and capitals of which were turned to new use in the colonnades or arcades of Christian churches, where it is not uncommon to find ranges of columns which obviously were not originally intended for the same building, of which the capitals do not match (as they always would in any antique classic building) and the columns do not range accurately in height. It seems not improbable that one special feature of the Byzantine capital, the *dosseret*, or cubical block

* *A* gives the plan of the building as a Pagan temple; *B* the transformation into a church, the cella walls being removed and some of the end columns used to continue the longitudinal colonnades of the church, and an apse added. The added and altered portions are shown by the shaded tint. The plan of an early basilica church, St. Demetrius at Thessalonica (*C*), perhaps half a century later, gives us nearly the typical plan of the early Christian church with its three apses at the east end, only that the side apses do not show externally, the plan being left square. This plan represents the last stage in the transformation.

forming a portion of an inverted cone, placed above the capital (Fig. 235), was in the first instance a device for

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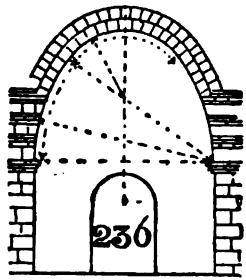
conveniently adjusting slight differences in height in the columns made use of. At the same time it made a more solid springing stone for the arch (as we have now got to the habitual use of the arch over the column), and replaces in this sense, and in a much better and more convenient manner, the absurd Roman arrangement of a piece of entablature balanced on the capital (see Fig. 70, page 77). But however the *dosseret* originated, it soon became the most marked feature of the Byzantine capital, so much so that by degrees the *dosseret* becomes the real capital; for this, I think, is the explanation of the change in the later Byzantine capital from the concave line of the classical capital to the convex line of the Byzantine one (Plate VIII.), the capital beneath the *dosseret* becoming insignificant by degrees, and then only surviving as a large moulding, while the *dosseret* became a decorated convex capital*, or sometimes a straight-lined one (see illustrations of Byzantine capitals in Plate VIII.).

Whence arose the predilection for domed building when the seat of the decaying Roman empire was transferred to Byzantium? We can have little doubt that it is Asiatic in origin, though the materials for tracing the process are very incomplete. The remains of domed

* Flandin and Coste, in their great work on Persia, give some capitals of Sassanian architecture which have the same convex outline as the Byzantine capital; but these are, perhaps, as likely to be derived from Byzantine detail as to have inspired it.

buildings erected by the Sassanidæ, who came into rule in Persia in the third century, and left architectural remains extending over the three succeeding centuries, show us structures such as that of which the section is given in Fig. 236, which may probably be attributed to the fourth century (though the dates of Sassanian buildings are still, and probably always will be, somewhat uncertain). Here we have a general system of plan and section which might very well have given a suggestion for such a church as St. Sophia, although the section of the dome is different; it is an upright ellipse, instead of a semicircle or segment of a semicircle. In purely Oriental architecture, where the dome is used, we generally find it of a comparatively high and narrow section, which is the Eastern type, as the semicircular dome is the Western type. Sassanian and Byzantine buildings may overlap in date to a certain extent, but there seems little doubt that the earliest Sassanian domes distinctly preceded the development of Byzantine domed architecture; and the prevalence of a taste for domical terminations in Western Asia at this period is again indicated by structure such as the tomb sketched in Fig. 237, as restored by De Vogüe in his "Syrie Centrale," and attributed by him to the fourth or fifth century. Such an erection could hardly have been possible on Latin soil at this period, though its pediment and pilasters are derived



from Rome. The pure Roman dome, such as the Pantheon and the domes which probably covered the circular apartments of some of the great Roman *thermæ*, was a dome on a circular substructure, and, therefore, an easy matter of construction (see pages 95, 96); the Byzantine was a dome on a square substructure, the internal gap between the ring of the dome and the angle of the square being filled in, as already remarked, by the quarter-dome, or "pendentive," which was the great invention of the Byzantine architects, but is suggested, though not fully carried out, by the Sassanian builders at Serbistan. A Roman taste for circular buildings undoubtedly followed the empire to Byzantium, and we find some of the early Byzantine buildings circular, while the link between these and the true Byzantine building is furnished by the church

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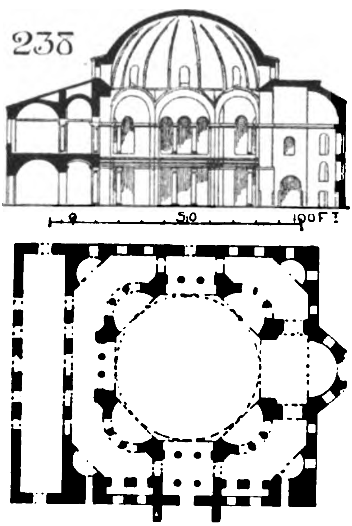
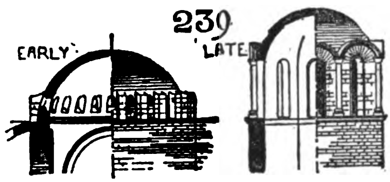


of SS. Sergius and Bacchus at Constantinople, sometimes said to be contemporary with St. Sophia, but which was probably just anterior to it and practically an experiment towards it. Here we have the flat section of dome lighted at the base (Fig. 238), just like St. Sophia; but the building, though square externally, has an inner circle of piers to carry the dome. It was the bold and grand stroke of the architect of St. Sophia to dispense with this support, and to hang his circular dome on pendentives over the square plan.

In St. Sophia Byzantine architecture at one bound reached its culmination; nothing equal to this, either in scale or in grandeur of conception, was ever produced in the same style subsequently. The great distinction between the style as exhibited in St. Sophia, and that of the later Byzantine churches at Constantinople and elsewhere, lies in the fact that the dome, instead of springing directly from its supporting point, was raised on a vertical wall pierced with large windows. The distinction between the two methods is shown in Fig. 239, and in the sketch of a late Byzantine church given in Plate VIII. Exterior height and greater external picturesqueness were gained by this means; the dome became an external feature as well as an internal one; and this expedient of elevating the dome on a circular "drum" (as it is called) high above the level of its pendentives, became also, as we shall see later on, the recognised method of dome-designing in western Europe, though, of course, with entire difference of detail. The defect, however, of this elevated treatment of the dome, as carried out in the later Byzantine style, is that the homogeneous domical character of the building is destroyed; the dome is internally less effective, being restricted in size (on account of the constructional difficulty of building a very large dome, with its great thrust, on the top of vertical walls interposed between it and its main abutments), and put at the top of a funnel, so to speak; and externally, although raised into a more prominent architectural feature in the composition, it has a high-shouldered and



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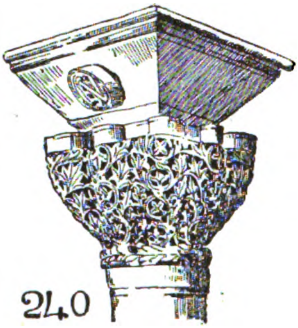
Byzantium, no doubt, from the time of Constantine to Justinian, had become the centre to which artists gravitated, and probably Justinian had to content himself with less accomplished artists here than at St. Sophia. Other churches of the basilica type of about the same period in Ravenna show the Byzantine manner, not quite so completely as San Vitale, but



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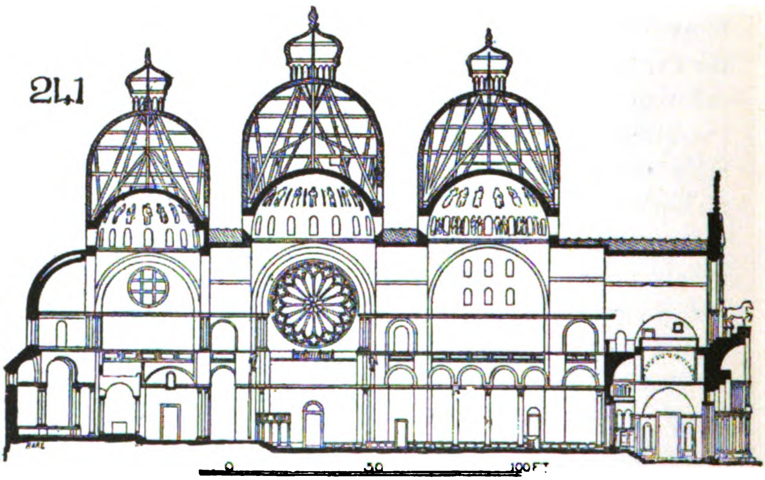

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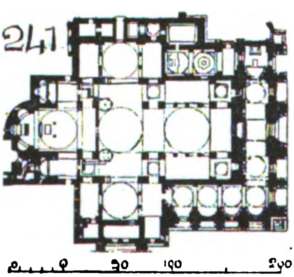

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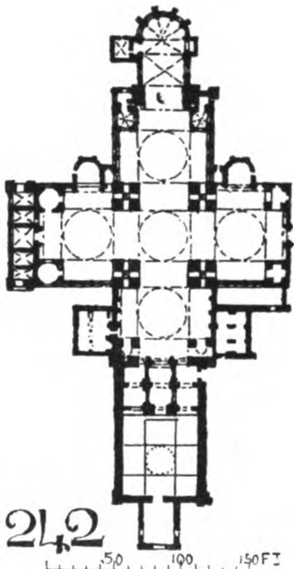
nevertheless unmistakably. And the influence of Byzantium in northern Italy did not end here. One of the most famous buildings of the early mediæval period, St. Mark's at Venice, the erection of which extended from the latter

part of the tenth to the middle of the eleventh century, is in all essentials of plan and design, and in the character of much of its detail, a Byzantine church, and keeps up this character also in its profuse use of colour, marbles and mosaic decoration. In the section (Fig. 241) it will be observed that the domes, as seen internally, are of the pure Byzantine type of construction as illustrated in St. Sophia—domes of shallow section springing directly from the supporting arches, without the intervention of any drum; externally their character is altered by the immense and rather gewgaw timber "bonnets" put over them. The church on the island of Torcello, a little later (in its present state) than St. Mark's, though a basilica church in plan, shows also many Byzantine characteristics; and throughout the whole of Lombardy we find, during the early mediæval period, marks of the influence of the Byzantine style.



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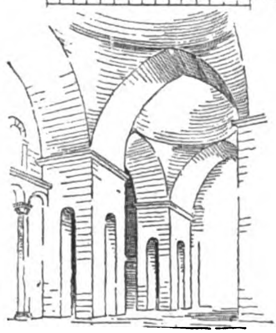
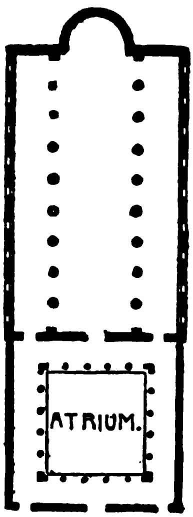


This influence is again met with in a much more marked form in some churches in the valley of the Charente in the south of France, of which St. Front at Perigueux is the most notable; the plan (Fig. 242) has an unmistakeable

resemblance to that of St. Mark, and the interior roofing is by a succession of domes in a somewhat similar manner, though these domes have the remarkable peculiarity (in the West) of being finished with masonry externally, instead of being covered with a separate wooden roof. For the prevalence of a domical quasi-Byzantine style in this particular part of France, no historical explanation can now, apparently, be given. The period to be assigned to this interesting group of buildings is probably, taking other details into consideration, the twelfth century. The most curious and unexpected outbreak of Byzantine influence on the architecture of subsequent periods is to be noted in a new and distinctly marked style in recent American architecture, started mainly by one architect of genius, the late Mr. Richardson, in whose work and that of his numerous imitators we find the Byzantine type of ornament and detail reappearing in quite recognisable form in the cities of the United States.

Returning now to the origin and development of the Christian type of three-aisled church, which, even in a merely architectural sense, is the most important and widely spread type of building in the world since the Christian era, we must remember that the Christians during the early part of their history were a small and persecuted sect, who could not have erected or ventured to hold worship in large churches of the basilica type till long after the time when they first made a practice of meeting together for common worship. That they met in the houses of some of the most important people among the believers is a natural conclusion; and Professor Baldwin Brown, who has treated the subject from this point of view

in his interesting little book, "From Schola to Cathedral," mentions the case of the small ancient church of St. Andrea in Barbara, in Rome, which fell into ruin in the seventeenth century, but which, according to the researches of de Rossi, was originally part of a house erected in the early part of the fourth century by a Roman consul, and at the time of its destruction still retained its original mosaics illustrating subjects in Pagan mythology. This idea of the church as originally the meeting-room in a house, perhaps subsequently consecrated for worship, gives a new interest to the plan of the Roman house (page 254), with its *atrium* court in front, and its colonnaded apartment or *peristylium* within. For it is remarkable that a square forecourt or *atrium* was a frequent accompaniment of or addition to an early basilica church, the complete typical plan of which is shown in Fig. 243; and we can easily imagine the steps by which the *atrium* and *peristylium* of the house in which the early Christians had met for worship, developed, when special buildings began to be erected as churches, into the *atrium* and colonnaded and triple aisle of the church. This colonnade and aisle was the real element suggested by the Pagan basilica, when it began to become necessary to consider how to roof over a larger space than could be covered in one span, while allowing free movement on the floor. The Roman basilica, with its columns carrying a wall above them, and its aisles with lower roofs, gave the constructional solution of the problem, with the



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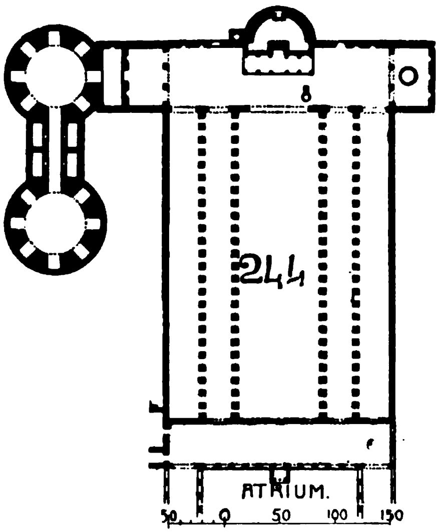
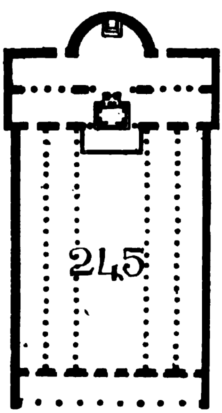
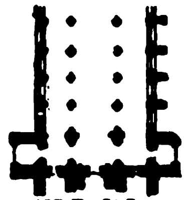
difference that a solid wall was substituted for the outer colonnade, the church not being required to be open everywhere for ingress and egress, as the genuine basilica or exchange was. (Compare Fig. 243 with the section in Fig. 227, page 253.) Thus we have the Latin form of Christian church owing its original suggestion to the dwelling-house, and its special mode of roofing to the basilica or mercantile exchange of the Romans. The feature of



the *atrium* in front of the church was indeed soon abandoned, except in a few isolated instances, but it left its mark on the plan of the Christian church in the shape of the frequent recurrence of the wide porch (called a *narthex*) extending over the whole of the entrance front. If we compare the plan of the ancient basilica of St. Peter, Fig. 244 (A.D. 306, measured before its destruction for the first foundation of the present St. Peter's), with that of the basilica of St. Paul, nearly a century later (Fig. 245), it is evident that the wide porch in front of the latter is, as far as plan is



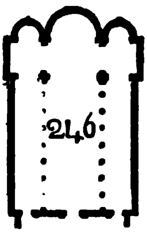
concerned, the eastern ambulatory of the *atrium* retained, while the rest of the square has been dispensed with; and this feature left its mark on the plan of the Christian church long after the architectural style of the basilica had been abandoned (as at the west end of Westminster Abbey, for example, and in the plan of Sens (Fig. 250), and in a more decided manner at Canterbury and Durham): and down to the present day the wide *narthex* porch is regarded as a feature specially appropriate to a college chapel, the nearest approach, in a modern Christian place of worship, to the simple form of semi-domestic church which was probably the earliest consecrated place of Christian worship.



The plans of these two early basilicas (Fig. 244, 245) indicate the origin of the cross or transept form which became afterwards the normal type of plan of the mediæval cathedral. The germ of the transept is seen in the cross-aisle at the upper end of the building, where the lateral colonnades are stopped and a clear space is left for the better administration of the more sacred portions of the ritual; and in the case of St. Peter's, the two wings projecting beyond the main line of the building were apparently intended to provide for the purposes of a baptistery and a sacristy without encroaching on the central space, while the apse provided all that was necessary in the way of a dignified seat-room for the clergy, before the period when the clerical office became so much magnified as it was subsequently, and when the laity were to be shut off from direct participation with the clergy in the ritual. As this supremacy and segregation of the clergy became more

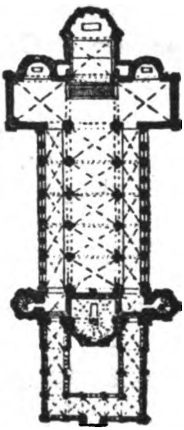
decisive, the original apse by degrees lengthened into the "choir" of the complete mediæval church, while the transept projection was maintained and more or less developed for purely architectural reasons, on account of the effective break it made in the lines of a long building, and in England more especially on account of the abutment which the cross-walls of the transept afforded against the pressure of the central tower, which is a special and predominating feature in English architecture. But the origin of the transeptal form of plan was utilitarian, although after it had been fully developed a symbolical meaning was attached to it, as representing the cross; but in this, as in a good many other instances, the religious symbolism was superinduced upon the architectural development, and was not the originating motive for it.

The nature and direction of the changes in plan from the basilica to the mediæval church may be illustrated by placing two or three typical plans in contiguity. The plain basilica plan continued to be the prevalent form of church, without much modification, down to the beginning of the tenth century; the chief change being that with the belief in the sanctity and efficacy of various saints came the addition of other apses to the church besides the principal one, by an obvious logical process; the original altar was placed in the apse, consequently the apse was a proper form of addition to adopt for the sites of subsidiary altars to saints. While the plain basilica plan was still in use, the first change



was effected by forming an apse at the end of each aisle instead of in the centre only (Fig. 246), often accompanied by a slight widening of the building at this point (as seen

also in the plan of the St. Paul basilica, Fig. 245), and the interruption of the colonnade by a wider spacing of piers. At a time when this arrangement had become common, the choir had not developed as a separate architectural division of the building, but was only divided off from the rest of the interior by a screen. The plan of Laach Abbey church, consecrated in 1056 (Fig. 247), shows very well the first commencement of the development of the choir by the pushing forward of the central apse in advance of the side ones; while the lateral widening has here attained nearly to the development of a transept. This plan is interesting also as an instance of the retention of the *atrium* or forecourt at a comparatively late date. The erection of a separate architectural choir, divided from the nave by the projection of the transepts, commences in the latter part of the tenth century, though examples are much more numerous after the early part of the eleventh century. The typical plan of a Norman church of shortly after the period of the Conquest is as shown in Fig. 248, where the choir has become a separate erection, though of less length and importance than it afterwards became; and



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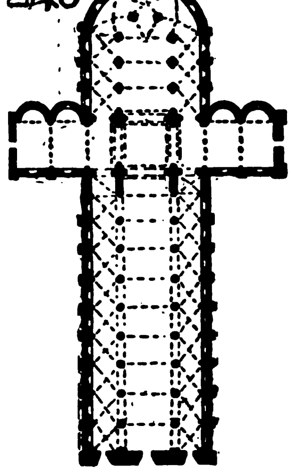
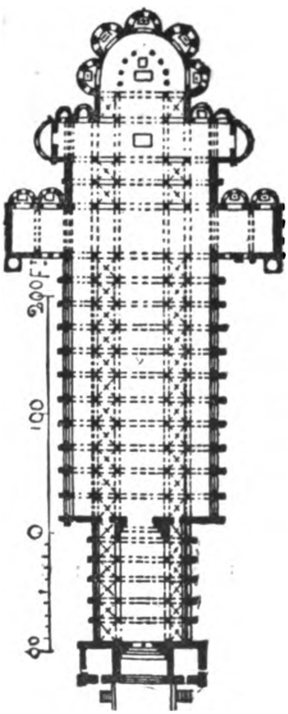


though the tri-apsal arrangement of the east end may not be maintained, the eastern side of the transepts is planned in a series of apsidal chapels, as they may still be seen at Canterbury and some other cathedrals where they have not been superseded by later work. Cluny Abbey church, consecrated in 1131 (Fig. 249), shows a further elongation and multiplicity of plan with double transepts, and it will be observed that not only has each transept its eastern apsidal chapels, but there is a ring of subordinate apses round the principal central one. This was an early and crude form of an arrangement which became peculiarly characteristic of French cathedral plans, that of finishing the east end with a series of chapels radiating from the centre of the principal apse; an arrangement which, as distinguished from the simple apse, was called a *chevet*; why, it is not easy to say. In the plan of Sens, which is a good specimen of an early cathedral of completely Gothic plan



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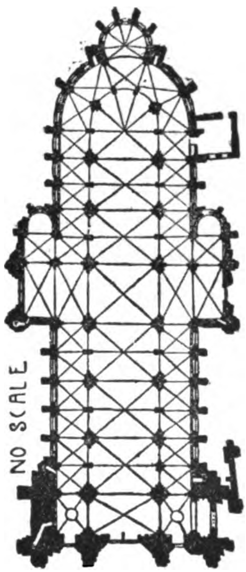
(Fig. 250), one such chapel only is introduced, and it will be observed that the transepts still show the feature of an eastern apse, which was nearly abandoned in complete Gothic. Amiens, commenced early in the thirteenth century, and a peculiarly typical French cathedral, shows in its

plan (Fig. 251) the *chevet* arrangement in its completed form, as well as two other characteristics of French plan, viz.: the slight projection of the transepts, and the absence of the large piers required to carry a tower over the crossing, a feature which the French did not affect—in fact, they carried their cathedrals too high to allow of the construction



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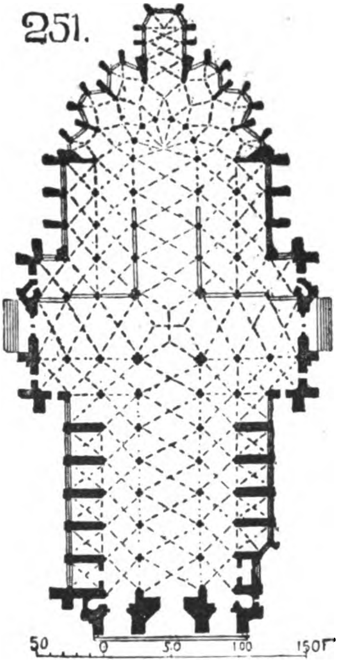

of a large tower above the roofs, either with safety or with due architectural proportion; they preferred marking the crossing of the main and transept roofs by a small spirelet only (*flèche*), which could be carried by the roof itself. The English architects for the most part preferred the square termination to their churches; where anything like the

chevet occurs in English churches it is nearly always traceable to direct French influence; and the plan of Salisbury (Fig. 252), commenced in the same year (1220) as Amiens, is as typically English as the other is typically French, except that the mass of the crossing piers is not so much emphasized as is usual in English cathedrals; and they have in fact proved to be too weak for their work (see page 107). It may be observed that in the plan of Salisbury, as in some other English plans, there is still a reminiscence of the placing of chapels on the east side of the transepts, in the fact that the transepts have an eastern aisle, but no western one.

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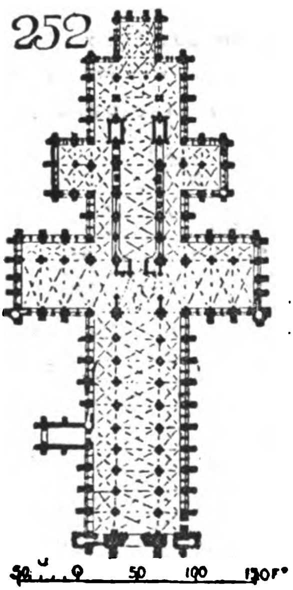
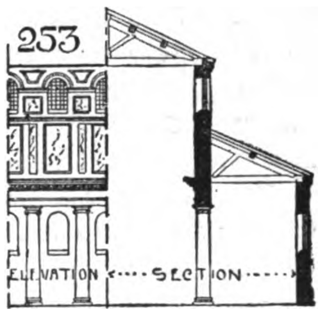


The process by which the Gothic vaulted roof was developed from the simple round-arched or "barrel" vault, and the important effect of this process in leading to the employment of the pointed instead of the round arch, has been traced and illustrated in Chapter III. of Part I. It remains now to illustrate briefly the general changes in architectural design and detail which accompanied the gradual transition from the architecture of the early Roman basilica church to the earliest completely Gothic form of mediæval cathedral. In the earliest basilica churches the exterior architecture was of the simplest kind, and the main feature of the internal architecture was a colonnade

dividing the centre from the side aisles, made up very often from columns pillaged from Pagan temples or other buildings (Hadrian's Mausoleum is believed to have furnished a good many columns for early Christian churches), and carrying a horizontal entablature similar to that of classic architecture; it was in fact the Greek temple turned inside out, with the solid wall outside and the colonnade within. A sketch of the interior of this typical form of early basilica church is given in Fig. 93 (page 101), and this was the form taken by the first basilica of St. Peter's at Rome. It will be seen, however, in the section of an early basilica of this type (Fig. 253), that the colonnade had far more wall above it than the mere classic entablature, the central portion



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rising to a considerable height above the roofs of the aisle, and the columns appearing quite disproportioned, according to classic notions, to the mass of the superstructure. Here, however, we have the first elements of the Gothic interior—the open colonnade, the blank wall against which the aisle roof abutted, and the wall above which was pierced with windows; which two portions became afterwards respectively the "triforium" and "clear-story" of the Gothic building, as shown in the section of a complete Gothic building in Fig. 114 (page 123). In the early basilica the blank wall corresponding to the aisle roof was usually decorated with paintings or mosaics; in the Gothic church it was treated architecturally with a wall-arcading. The next step in the early basilica was to transform the

colonnade into an arcade with circular arches springing from the columns. The basilica was still roofed with a timber roof with a flat ceiling, and had this been retained the basilica architecture might have remained for a long time stationary in the form to which it had now attained. It was the attempt to render it a more monumental structure by making the roof of a material homogeneous with the walls which directly led to all the further developments in the form of piers and roofing which have already been described in Chapter III., and by degrees transformed the classic column of the early basilica into the built-up "pier" of the Gothic church, with a plan in which each projection has a direct reference to the section of the arch mouldings, and to the design of the vaulted roof.

The general changes in architectural character in the process of transformation from the early Romanesque architecture of the fifth century to the complete Gothic of the early thirteenth century can only be briefly touched on here, and illustrated by a few sketches of typical examples. The main sources of effect, in addition to the vaulted roof internally, are the disposition and grouping of windows, which acquire a much greater size and architectural importance than in the ancient basilica; the development of the classic pilaster into the Gothic buttress (see page 103), and the accompanying tendency to emphasize the vertical lines of the design, instead of the horizontal ones as in classic architecture, a tendency further illustrated by the introduction of such features as pinnacles and turrets, breaking up the skyline and carrying the eye upwards; the increased emphasis given to light and shadow effect produced by deep mouldings, which are used in positions (as on the under surface of arches) where the early basilica builders would

ROMANESQUE TO GOTHIC.

have been content with a flat surface; the much more free and less conventional treatment of carved foliage; the more or less pompous treatment of the entrance façade, or "west front," as we call it in England (where all our churches are orientated eastward); and the introduction of towers, either as a portion of the building or closely connected with it. This last is one of the most distinctive features of the mediæval church; we are so accustomed to connect a tower with the idea of a church that we hardly realise that the early Christian churches from which the main form of our cathedrals is developed had no towers, except in one or two isolated cases (S. Apollinare in Classe, at Ravenna, for instance), probably for some reason unconnected with the sacred use of the building. The development of the tower (especially of the English central tower) in mediæval buildings was much more for the sake of architectural effect than for any ritual reason; bells were hung in the towers, it is true, but they would have been built all the same if there had been no such things as bells.

The few sketches on Plate IX. serve to indicate the nature of the stages by which the transition from Romanesque architecture to complete Gothic was effected. In Italy, the land in which the basilica type of Mediæval church had birth, the classic tradition always maintained so much of its influence that true Gothic on that soil was never reached at all. The column and pilaster never quite lost their hold on the affections of the architect; the nature of the climate combined with the classic tradition to induce the retaining of the low-pitched roof and pediment of Roman architecture (the Gothic high-pitched roof having in part at least a practical object, enabling the roof to

free itself quickly from snow and rain); the bright sunlight of Italy did not call for the strongly marked rounds and hollows which we find in true Gothic mouldings; the mouldings remained comparatively slight in projection and little emphasized in shadow; and the typical Italian tower, or *campanile*, as it is commonly called*, is a straight-lined erection with no principle of growth in it; it is either a series of stages or stories merely superimposed, or a tall straight stalk with a cornice and a decorative lantern stage built on it above the cornice, but still with no connection in design between the upper and lower portion, as in a Northern Gothic tower and spire; the old tradition of horizontality, left by the classic order, having taken such hold of the Italian mind. The lofty stalk of bare wall, with the lantern stage at the top, is, however, a fine and expressive type of tower; only it is rather an adjunct to the main building, than a part of it. The small size and plain character of the windows in Italian Gothic, which are generally only narrow round-headed or pointed-arched openings, single or in groups of two, is also characteristic of the traditions of classic architecture, in which windows were not recognised at all as part of the design. The typical west front of an Italian church is a pedimented façade, with a sloping cornice, and with the side portions also forming the slope of the aisle roofs; perhaps one of the most

* The special use of this word in Italy for a tower is significant. It would of course be equally applicable to any tower in which bells are hung, but it has come to be regarded as defining the Italian type of tower; and the use of this word for tower in Italy seems to indicate its common function as an erection for a special purpose, and an addition to rather than a part of the main architectural design. In English and French Gothic the towers are an integral feature of the architectural conception.

characteristic Italian façades of this semi-Gothic period is that of Pisa Cathedral (eleventh century), where the multiplicity of arcades is Gothic in sentiment, though the separate details are much more classic in character. Late in the thirteenth century, as at Siena, the more Gothic method began to be adopted of treating a façade as a separate design in itself, not a mere outline of the ends of three aisles with sloping roofs, which can never have a dignified effect as the front of a great building.

But in France and Germany the typical treatment of the west end from an early period was that of two great towers flanking the front and masking the ends of the aisles, with a grand recessed entrance porch and generally a large central window between them; a much finer ideal than the Italian façade. In England both forms of front have been used, to which fact the English cathedrals owe a good deal of their remarkable variety of interest and architectural character. At York and Durham, for example, we have the French towered façade; at Peterborough the Italian façade, in an unusually fine and impressive form; at Lincoln a rather illogical combination of both; the western towers are there, with their lower portion masked by a façade of the Italian type. But the great point in which the English cathedral type is certainly superior either to the French or German is in the almost universal adoption of a great central tower, with or without a spire, at the central point or "crossing," where the nave, choir, and transepts intersect. As already observed, the English were the better able to do this because they were less ambitious in regard to the height of their interiors than the French, who carried their vaults and roofs to such a height that no room was left for a tower

of any importance above the roof. This internal height is a grand feature, no doubt, but it may be questioned whether the completeness and concentration given to the exterior architecture by the central tower does not more than compensate for the loss of internal height; the building becomes a better-proportioned and more harmonious whole. In a French cathedral exterior the "crossing" is the weak point; in an English cathedral it is the strong one. The combination of an effective western façade with a dominating central tower at a very early stage of English architecture, is finely shown in the case of Tewkesbury Abbey (early twelfth century), a view of the west front of which, with the centre tower beyond, forms the frontispiece to this section of the book. The front also shows what a grand and powerful effect could be attained by the use of a large circular-headed arch, with the rude massive detail of the period.*

The process of transition from Romanesque to Gothic, in regard to detailed treatment, is in its broad lines pretty much the same in Germany as in France; in England it is hardly traceable, as we have no architectural monuments remaining, of any importance, previous to the importation of Norman architecture with the Conquest. Both in Germany and in France we find, as shown in the sketches of types of successive dates in Plate IX., the employment in the transition period of flat projecting strips on the exterior walls, like classic pilasters that have lost their capitals; or sometimes in France retaining their capitals, but used nevertheless as buttresses rather than as columns. In both, as well as in the early Norman archi-

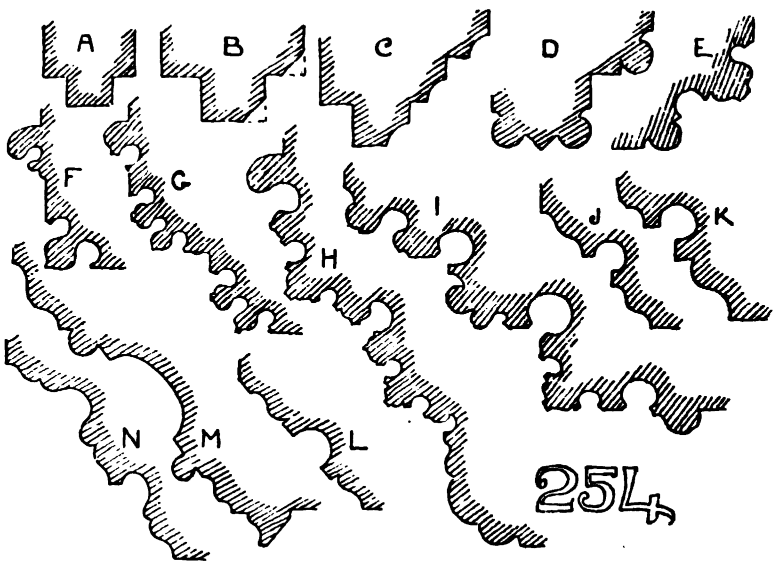
* The large traceried window is of course an insertion at a much later period; probably late in the sixteenth century.

tecture built in England, we find small round-headed windows, and a use of arcades on the face of the wall to give decorative effect in special positions. In the German transitional churches there is, in the tendency to the use of high and rather narrow straight-lined towers of the campanile type, a certain special influence from north Italy perceptible, though the character of the German tower is entirely altered and individualised by the slated spire with which it is crowned, which gives it a perfectly different expression from the Italian campanile with its low-pitched roof and its separate lantern stage; the treatment of the openings in the Italian tower, with arcades carried on small columns, is also more classic in feeling, as is the more decided development of the crowning cornice.

The stages of development of the interior architecture from Romanesque to complete Gothic, are broadly indicated in the three sketches of portions of piers, arches, and triforia, in Plate IX., where the transition is shown from the rounded column and plain arches of the Romanesque type to the multiple pier and strongly moulded arch of complete Gothic; from the plain circular-headed openings of the Romanesque or Norman triforium to the graceful architectural treatment of the "Early English style"; and from the flat pilaster-like vaulting-shafts of the Romanesque* to the rounded shafts of the complete Gothic. In the two first examples the placing of the vaulting-shaft on the

* In fact, during the period of Romanesque architecture, it may be said that both internally and externally the principal means of giving architectural expression to the main wall surfaces of a building consisted in the introduction, at regular intervals, greater or less as the case might be, of flat projecting strips of masonry, which were nothing but the remains of the Roman pilaster with the capital and base knocked off.

capital of the main pier, with a base of its own, shows how the tradition of the classic column was still dominant. In ornamental carving we find the severity of the classic types of ornament giving way to a more free treatment, especially in English work, the classic feeling being retained later in French work than in English; the respective types of thirteenth century work are indicated in Figs. 161 and 162,



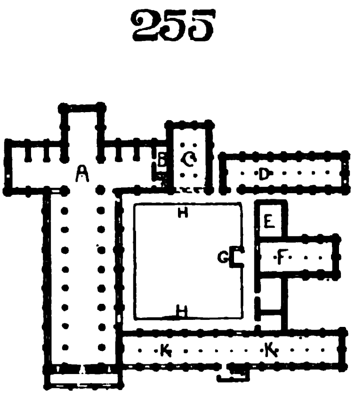
A, B: Early Norman (11th century); C, D, E: Transitional (early 12th century); F, G: Early English (late 12th and early 13th century); H, I: Decorated (late 13th and early 14th century); J, K: Late Decorated (late 14th century); L, M, N: Perpendicular (15th and early 16th century).

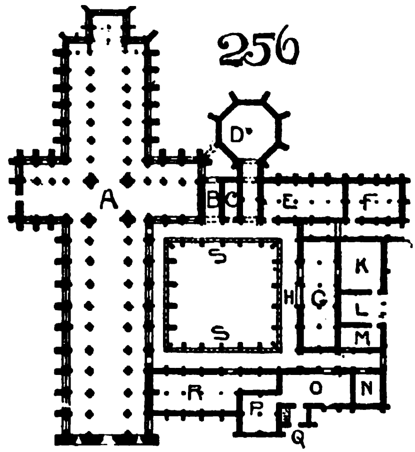
Plate III., where the general relation between classic and mediæval ornament is also indicated. Some other typical forms of Gothic ornament will be found on page 307, and in Fig. 254 are shown some sections of mouldings of various dates. We have to notice also the effect on the exterior of the building produced not only by the development of the

pilaster into the buttress, but by the immense importance acquired by the flying buttress, in French Gothic especially, where the lofty vaulted roofs were only kept in their places by an elaborate scaffolding of flying buttresses to hold them up and transmit the pressure to the main buttresses. And lastly, and partly in connection with this, comes the change in the general exterior aspect arising from the addition of such features as pinnacles and spirelets, by which the old level lines of the classic temple or basilica, which continued to predominate as long as Romanesque influence retained its hold, are broken by so many vertical and aspiring terminations, entirely changing the character of the mass of the building; and these again, like the buttress, are of utilitarian origin, for the pinnacle was in the first instance a building up of the buttress above the point of junction of the flying buttress, to give it greater vertical weight and stability; then this vertical erection required a decorative termination, and so led to the taste for pinnacles and analogous additions, of which the spire on a large scale, whether on the western or central towers, is only the culmination.

A word may be added here as to the group of buildings of which the abbey church (in later times the "cathedral") formed only a portion, though architecturally by far the most important portion. As no ancient abbey in England remains in a complete state, people seldom realise the manner in which the church was combined with the conventual buildings, and are apt to think only of the church as it mostly exists now, as a separate structure, with a cloister and chapter-house adjoining it. But the cloister was really the courtyard around which the buildings were grouped, generally on the south side of the church (the

nave of which formed one boundary of the cloister); the enclosed cloister walk forming the main corridor of communication. Figs. 255 and 256 show the typical arrangement of a Cistercian monastery of the early twelfth century, and a Benedictine monastery of the thirteenth





255. A: Church; B: Sacristy; C: Chapter-House; D: Day-room; E: Kitchen (position varies); F: Refectory; G: Lavatory (sometimes in cloister wall, see H, Fig. 256); H: Cloister walk (generally only a timber lean-to); K: called by Sharpe the *Domus Conversorum*, but its use uncertain. (Dormitory over D and part of C.)

256. A: Church; B: Slype (a passage); C: Cell occasionally found here; D: Chapter-House; E: Day-room; F: Calefactory (a warmed room, partly for invalids); G: Refectory; H: Lavatory; K, L: Kitchen and Kitchen Court (position varies); M: Abbot's Kitchen, and N, O, P, Q: Abbot's House (often in this position, but varies very much; sometimes it was an entirely separate building); R: Cellarage; S: Cloister walk. (Dormitory over B, C, E.)

century. The chief difference in the arrangement of the buildings is that the refectory in the Cistercian building runs north and south, at right angles to the south cloister walk,* while in the Benedictine monastery it is parallel with the

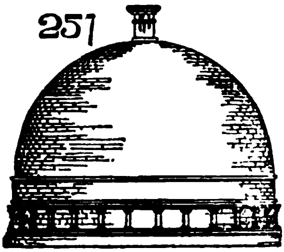
* The cloister and its adjoining buildings were sometimes placed (as at Canterbury, for instance) on the north side of the church; but the south was the most usual position.

cloister walk.* The distinction between the rectangular or octagonal form of the chapter-house is rather a matter of date than of ritual, the octagonal form receiving the preference in and after the thirteenth century, probably on account of the picturesque exterior and interior effects of which it was capable.

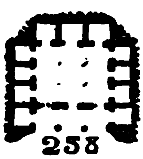
Having traced the transformation of the Roman and Romanesque basilica into the earliest complete Gothic form, that of the thirteenth century, we must turn backward for a moment to give a hasty glance at those two architectural developments which, as before observed, form the only two of any importance outside of the European area, since the Christian era, viz.: Indian and Saracenic architecture. Indian, that is to say Buddhist and Hindu architecture, may be said to be almost the property of Fergusson, who alone among writers on architecture made it a special study, and attributed to it an architectural importance which few will be disposed to accord to this bewildering medley of barbaric structures, for the most part ugly and disproportioned in outline, and grotesque in detail. The few points in connection with Indian architecture which are of historic or artistic interest may, however, be briefly mentioned. The most notable built monuments of the earlier architecture (Buddhist) are the "topes," as they are called, some of which are believed to date from a century or two before the Christian era, and

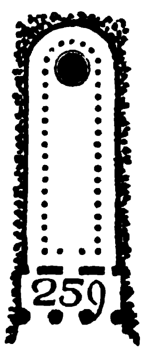
* The Cistercians were an offshoot from the Benedictines in the eleventh century, their separate existence, or at least importance, lasting for about two centuries. They professed a sterner rule than the Benedictines, and their buildings are remarkable for their plain and severe treatment, and the absence or very sparing employment of carved ornament.

which consist of solid or nearly solid domical masses of masonry springing from a low base or drum, which in



general shows a rude architectural treatment of pilasters (Fig. 257), or some other simple decoration. There is a curious resemblance in the general conception of these erections to the type of Etruscan tumulus (Fig. 219, page 242), only that the shape is domical instead of conical; while in purpose they seem to have some resemblance to the Egyptian pyramid, as monuments and places for the preservation of relics. Some of these topes, of which that at Sanchi is the most celebrated, have been surrounded by massive stone railings, clumsily made in imitation of an earlier form of wooden palisades; the typical form of these is indicated in Fig. 141 (page 148). The Sanchi tope has also a most elaborately carved stone gateway, or gateway screen, a manifest imitation of timber framing; a cast of this is in the South Kensington Museum.

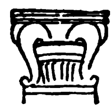




A number of early rock-cut caves in various parts of India, of the type of plan shown in Fig. 258, have a significant resemblance in plan to the early Egyptian rock-tombs (see page 210); a resemblance which seems more than mere accident. On the other hand, the much more remarkable colonnaded cave temples called "Chaitya halls" (Fig. 259) have a resemblance to the early Christian basilica church, colonnaded aisles

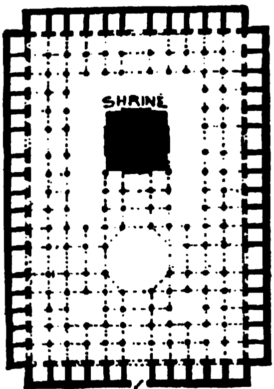
with an apsidal termination, which is one of the most curious coincidences in architectural history; it can only be a coincidence, as some of these caves are believed to be anterior to the Christian era, and it is quite certain that the basilica church owed nothing to them. The roofs of the chaitya halls present a curiously complete example of rock-cut imitation of timber work, being usually shaped into the resemblance of thin rafters cut to a curve and placed edgeways, forming a succession of ribs on the roof.

Two details worth mention the Buddhist architects added to the art: the bracket capital—which was afterwards further elaborated by the Hindus—and what may be called the flower-vase capital; shown in a sketch in Plate X. It is one of the many evidences of the Oriental relations of Venice, that bracket capitals of nearly the same form are found in St. Mark's, though with difference of detail. The flower-vase form of capital, when cut in block without the carving, closely resembles a detail in the Persian capital previously mentioned and illustrated (Plate VII.). Some of the rock-cut columns of Indian architecture (Plate X.), faulty as they are in proportion and semi-barbaric in aspect, contain ideas which would be worth further development.



Hindu architecture is a maze of grotesqueness and incongruity as bewildering as Hindu mythology. Fergusson classifies it into Jaina, Dravidian, and Chalukyan styles, though it is possible that further study might lead to a revisal of this classification, if it were worth while. Jaina architecture is noteworthy for its halls with pillars spaced at equal distances, except where they make way for an octagonal dome over an open space (Fig. 260). The pillars

are remarkable for the combination of the bracket capital with a flying strut in the style sketched in Plate X., and which is one of the best known features of Hindu architecture; but though it professes to be a constructive feature (to support the centre of the lintel), it may be doubted whether it has any constructive value whatever. The Dravidian temples consist largely of enclosures one within another, with pyramidal gate-piers, and occasionally with a pagoda as a central object.* These pyramidal towers over the gateways recall



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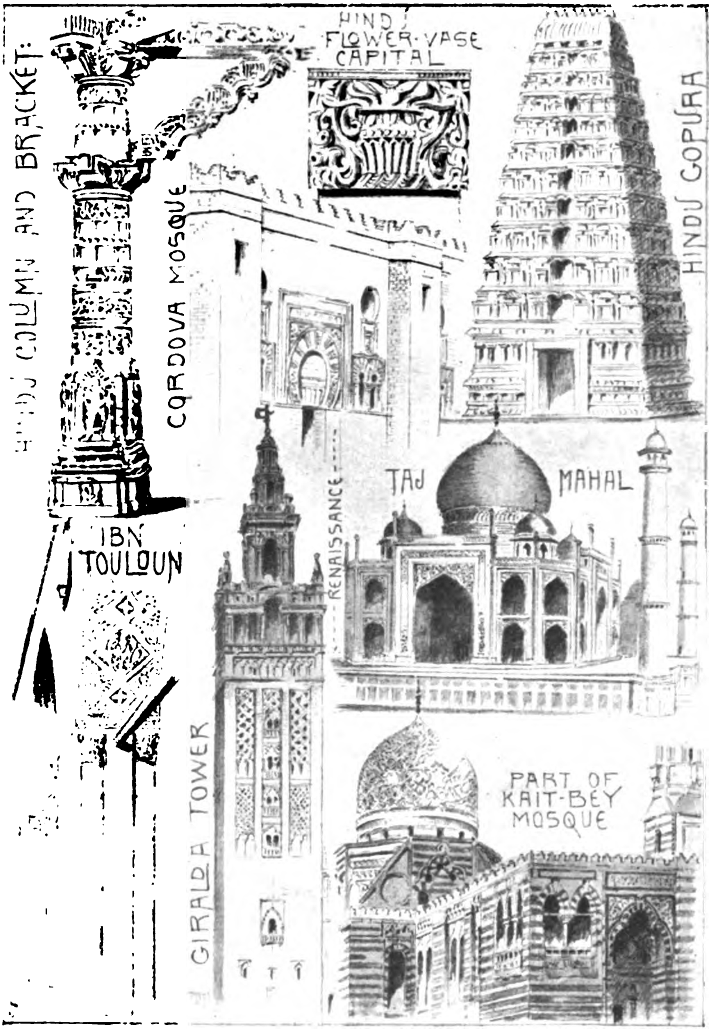
the Egyptian gate-pylons, and may have been derived from them, though they are very differently treated in detail (see sketch, Plate X.). The Chalukyan style is notable for an enormous and bewildering elaboration of surface ornament, some of it very rich in effect, and for a kind of coffer-like design, with heavy masses of ornament and sculpture piled in horizontal lines one over the other, the structure appearing often as if it were all base and roof, with nothing between.

Although the pillared halls of Jaina architecture and the gate-towers of the Dravidians are striking architectural incidents, it may be said of nearly all the multifarious productions of Hindu architecture, when untouched by Mahommedan influence, that they entirely lack that expression of restraint, of choice, of intellectual perception as to the

* The gate-towers (*gopuras*) are popularly called pagodas, and are in fact nearly the same thing in a different position.

X.



INDIAN AND SARACENIC.

value and appropriateness of details, without which nothing worth calling an architectural style can be realised. The characteristic, in fact, of Hindu architecture in general is that it is entirely devoid of "style"; it is a medley or fantastic riot of details crammed together merely for the sake of covering the walls with detail, without any consideration of balance or proportion of parts, or beauty of outline; and as to mouldings, there are no such things in the true sense of the word. It was only with the advent of the Mahommedan conquerors that the Hindu fecundity in ornament and detail was brought into more intellectual training, and produced some of the most beautiful works of architectural art in the world.

The northern region of India, which was nearer to European influence, Greek and Roman, contains remains, as at Martand in Kashmir, which are historically interesting as showing obviously the influence of classic architecture. But though the columnar order, the entablature, and the pediment are recognisable, and although the classic example has had influence enough to check the lavish effusion of barbaric surface ornament which characterises unadulterated Hindu architecture, still all the delicate proportion of parts and refinement of profile are gone, and what remains is only a clumsy travesty of the architectural forms of Greece and Rome, interesting rather to archæological historians than to architects.

It is difficult to define the exact limits, either as to place or details of style, of the school of architecture embraced under the general term "Saracenic," and there is not even common consent as to this title, some writers speaking of it as "Arabic," others as "Moorish" or "Moresque," according as their attention is directed

mainly to its monuments in Arabia, Egypt, or Spain. But as this school of architecture originated in Arabia, after the Arabian followers of Mahommed had become a power in the world and were known under the title of Saracens, "Saracenic" seems the most logical and comprehensive definition. Like Roman architecture, Saracenic is an architecture carried into various countries in the train of conquest. But unlike the Romans, who erected their temples and theatres and triumphal arches in the same style wherever they penetrated, with a sublime indifference to the native architectural styles of the conquered countries, the Mahommedan conquerors, while bringing with them their own form of temple and their own architectural predilections, were nevertheless considerably influenced by native tastes in regard to detail and sometimes even in regard to construction. Saracenic architecture, therefore, is an architecture emanating from Arabia in the first instance, pushing its way into India, into Turkey, into Egypt and North Africa, and thence into Spain, but in each case deriving a certain amount of "local colour," as we may call it, from the people among whom it penetrated. Its leading characteristics are easily recognisable everywhere; its feeling and detail are to some extent local.

The mosques, the places of worship of the Mahommedan religion, which are the principal typical structures of Saracenic architecture, were not, like all other temples in architectural history, sacred places, the abode of the Deity in a special sense. The only sacred place was Mecca; elsewhere, the mosque was merely a covered place for retirement and for prayer. Here, therefore, there is no colonnade or arcade leading up to a shrine; the typical

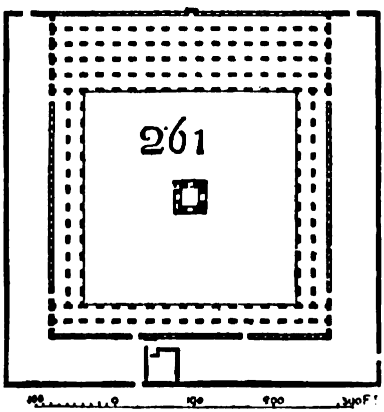
mosque is a large square enclosure with arcaded cloisters round it, the cloister or vaulted portion being almost always much deeper on the side towards Mecca, in the boundary wall of which a niche (the *mihrab*) marks the direction of Mecca; occasionally there are several such niches. No origin can be given for this form of plan, except the simple practical one suggested by Professor Hayter Lewis,* that the builders of the earliest mosques in this form, such as that of Amru at Cairo (642 A.D.), were Christians, who had no precedent to go on for producing this new type of temple for their Arab conquerors:

> "He had to adapt the remains of earlier buildings to the special purpose of the Arabs. So for the mosque he provided colonnades tied together with wooden beams, and supporting a roof to shelter the worshippers, a mihrab or niche to mark the direction of their worship, a fountain for their ablutions, and a wall to enclose and protect the whole, and thus gave a model which has been followed through all time in the Moslem mosques, as much as the basilica form has been in the Christian Church."

The oldest mosque of the typical square type now existing is that of El-Aksah at Jerusalem, built by Abd-el-Malek about 690; but the existing portion, according to Professor Hayter Lewis, is only part of the original plan, which he restores as a much larger area covered equally with columns except for a slightly wider aisle in the centre. The so-called "Mosque of Omar" or "Dome of the Rock" at Jerusalem, credited to the same date and the same Caliph, an octagonal building with an Arabic dome of the tenth century, was probably not built as a mosque, and seems to have been a building

* "Holy Places of Jerusalem."

erected under Byzantine influence (architecturally speaking) and with columns and capitals pillaged from Byzantine buildings: an exceptional building, presenting a very interesting historical problem. The earliest complete mosque of the typical form is that of Ibn Touloun at Cairo,

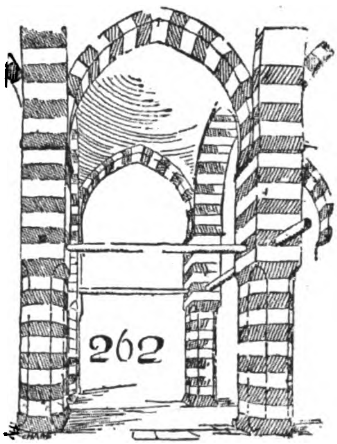


towards the close of the ninth century. The plan of this is given in Fig. 261, where the *mihrab* or prayer-niche is seen in the middle of the wall on the upper side of the plan, in the rear of the wide arcade. A sketch of a part of the arcades, given on Plate X., shows a considerable survival of Byzantine influence in the style of the capitals and ornament, and shows also the early use of the pointed arch in this class of building.* The mosque called after the name of Sultan Barkauk, or Berkook, of the middle of the twelfth century,† is a fine

* The theory that the pointed arch in Western Gothic was derived from Saracenic architecture (as a result of the First Crusade) was popular at one time, and is still occasionally heard of; but it is an impossible one. The First Crusaders had other things to think of; they were little likely to take interest in the architecture of the hated Saracen. The Western form of pointed arch is not the same as the Eastern; and in England at least, as already observed, the pointed arch was reluctantly adopted, for constructional reasons, in buildings in which the merely decorative arches were still rounded.

† It is dated by Coste ("L'Architecture Arabe"), 1149. He must have had a reason for dating it so precisely, though Sultan Berkook lived in the fourteenth century. Possibly Berkook added to or altered the building, which thus became connected with his name. The

example, in which the piers and arches have assumed a more mediæval form (Fig. 262), and illustrates the practice of returning the curve of the arch backwards at the springing, so as to produce the horseshoe shape which became a common characteristic of Saracenic architecture. The origin of the predilection for this form of arch it is not easy to understand, but it possibly arose from an idea that, in a series of arches on narrow piers, the thrust of the arch was to some extent counteracted by returning it on itself in this way, and a broader basis given to the springing stones. It should be added that in the Berkook mosque the square compartments between the piers are all covered in with domed vaulting.



Historically the course of Saracenic architecture in Egypt is comprised under three periods: that from the seventh to the thirteenth century, of which there are few important monuments, and during which Byzantine influence survived; the period of Mameluk rule, to the close of the fifteenth century, to which the finest mosques belong; and the period under Turkish rule, down to the eighteenth century; architecturally a period of decline and debasement. During the second of these periods another form

architecture of the arcades certainly looks a great deal more like twelfth century than fourteenth century work.

of mosque plan came into adoption; a cross form, with a large open space in the centre, and four great arched apartments opening one from each side of the court, of which one of the most notable examples is the mosque of Sultan Hassan at Cairo, about the middle of the fourteenth century (Fig. 263). This did not, however, displace the square form, which still continued in use. During the middle or best period of Egyptian Saracenic architecture, minarets and domes became important architectural features. The minaret had a practical object, as the place from which the call to prayers could be made over the city; and these erections are familiar to every one as associated with Mahommedan architecture in the East, but they are mostly picturesque rather than truly architectural in design. The Saracenic dome, on the other hand, is at its best one of the most beautiful features which architecture has produced. It has no necessary reference to what may be called the church portion of the mosque; it usually marks the place of a sepulchral or monumental chamber attached to the main building. Its external outline is that of the form of pointed arch

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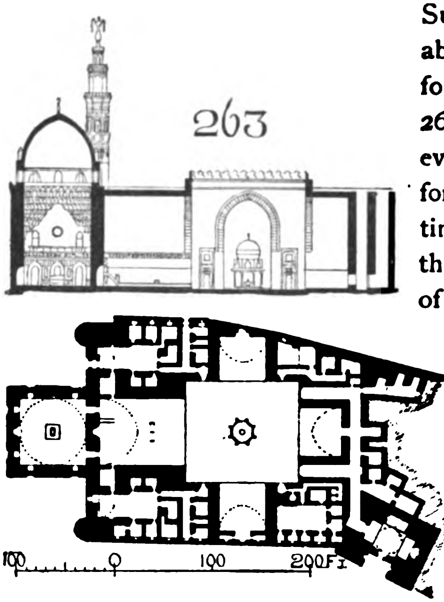
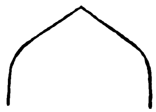
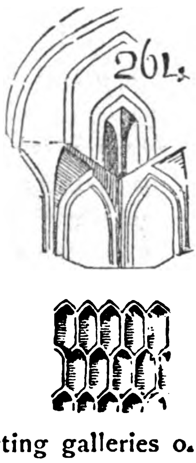


characteristic of Saracenic architecture; a quick curve in the lower portion, with a nearly straight finish; the



lower portion of the cupola is "stilted" or vertical; the surface is decorated with diaper ornament, sometimes carved in stone, sometimes executed in plaster on a brick construction. Internally a remarkable feature is the decorative treatment of the pendentives (see pages 95, 96) in a series of little miniature arches forming a kind of fretwork of edges and hollows (Fig. 264). This became a common and prevalent form of ornament in Saracenic work everywhere; it is imitated in roofs (as in the Alhambra) where there is no real arch or dome construction at all; it forms the corbelling often to the projecting galleries o. the minarets; it is introduced as a finish between projecting piers in the exterior walling (Fig. 265).



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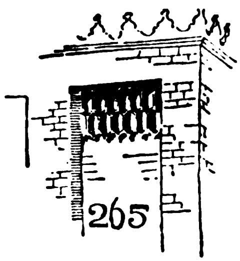

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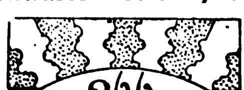
The mosque of Kait-bey, fifteenth century (Plate X.) is perhaps the most typical of the finest period of Egyptian Saracenic. Among other special characteristics of Saracenic architecture are the use of masonry, or masonry and brick, in bands of contrasted colour; a variety and ingenuity in the manner of cutting and fitting arch-stones of contrasted colours (Fig. 266)—this is more especially Egyptian; the habit of building arched



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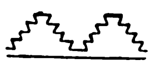
openings (other than continuous arcades) within a square-headed framework; the use of an exterior cresting as a finish to the walls of a character  which appears to be derived from Persian architecture; and the predilection for an elaborate form of geometrical puzzle-ornament for wall-tiles, coloured plaster work, and window lattices (Fig. 267: see also pages 150 and 162). We cannot trace the origin of the passion for geometrical

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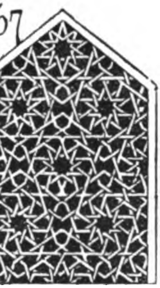
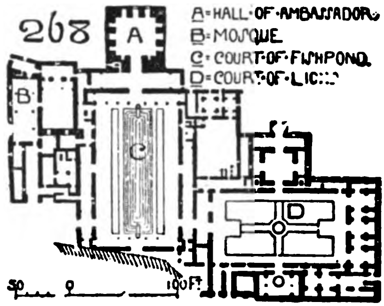


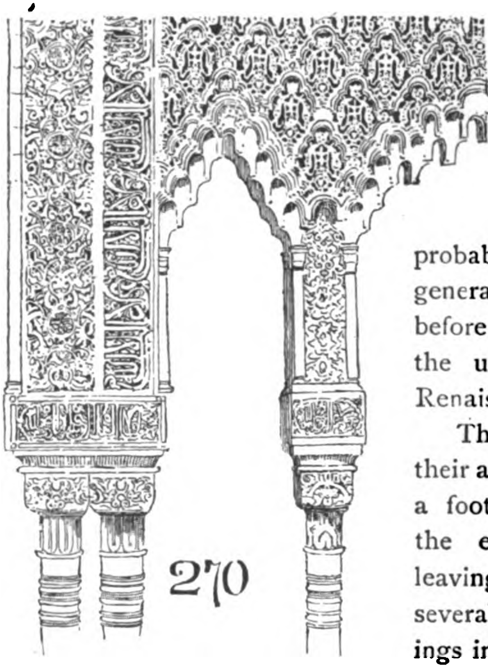
ornament of this type; it occurs quite early in the history of the style; but no doubt its development, when once the suggestion was given, was prompted in part by the Mahommedan prohibition of the imitation of natural objects in ornament, in part by the innate geometrical genius of the Arabian mind.

The more western portions of the North African seaboard were no doubt the scene of a good many works of Saracenic architecture of which few important remains exist now; but the Mahommedan settlements here became the connecting link with Spain, the southern portion of which was invaded by the Moors early in the eighth century; and on Spanish ground they left some of the most notable monuments of the Saracenic style, especially the mosque at Cordova, commenced at the end of the eighth century and added to in the tenth century; the Alcazar and Giralda at Seville (commencement of the thirteenth century); and the palace of the Alhambra, commenced about the middle of the thirteenth century, and carried on and added to for a period extending over nearly a



century further. The plan of the Alhambra is given in Fig. 268. The exterior of the Cordova mosque, a portion of which is sketched on Plate X., is very fortress-like with its recurring turrets; the Alhambra also seems but a fortress externally, but internally both buildings show a degree of rich and fanciful elaboration of detail which, curiously enough, though these buildings are the most westerly monuments of Saracenic architecture, is far more distinctly Oriental in feeling than anything to be found even in Egypt, and seems to point to some connection between the builders of these and the Indian Saracenic architects. The thin columns and the riot of foliated arches (purely decorative, not constructional) in the later portions of the interior of the Cordova mosque (Fig. 269) are exceedingly Eastern in character; so is the detail from the "patio de los leones" at the Alhambra (Fig. 270), where also the arches are not constructional at all, the real construction being a lintel one; this sham use of the arch as a mere ornament being a special characteristic of Spanish Saracenic. Fig. 270 illustrates also the use of Arabic inscriptions as a portion of the decoration, which is especially frequent

in the Alhambra.* In the Giralda at Seville (see Plate X.), the Saracenic architects achieved a tower which is worth all the minarets they ever built, and which in general design shows a curious resemblance to one of the types of Italian campanile; a resemblance which it probably showed, in general outline, even before the rebuilding of the upper stage with Renaissance detail.



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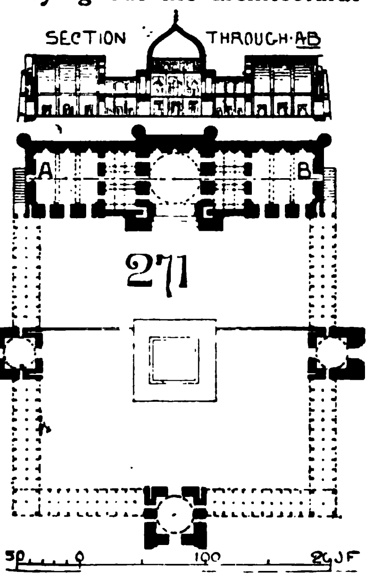
The Saracens and their architecture gained a footing in Sicily in the eleventh century, leaving a palace and several smaller buildings in Palermo and its vicinity as monuments of their temporary success.

After the capture of Constantinople by the Turks in 1453, and their subsequent prominent influence in the Saracenic world, the prevalent type of mosque became a form based on an imitation of the plan and section of

* "That haze which seems
Floating about the panel, if there gleams
A sunbeam over it, will turn to gold,
And in light-graven characters unfold
The Arab's wisdom everywhere."—SORDELLO.

St. Sophia, but the architectural value of the mosques erected under Turkish influence is exceedingly inferior to that of the earlier school of buildings.

The Saracenic architecture of India forms a large subject in itself, and we can merely touch upon its main characteristics. It was not till the early part of the thirteenth century that the Mahommedan rule gained any extended and decisive footing in India, and the mosques at Delhi and Ajmir, which were among the earliest monuments of the conquest, present a curious combination of Saracenic plans and general feeling with a good deal of Hindu detail. It is owing to this influence of local habits and tastes in carrying out the architectural ideas of an alien race that there are many varieties of Saracenic architecture in India, which are hardly even yet properly classified. But there are certain common characteristics. We find everywhere the Moslem form of pointed arch, with the nearly straight curve in the upper portion (the return or horseshoe form is not common), and always with rectangular framing over it. But the arch in Indian



Saracenic building is always a genuine piece of construction; the manner of building is a great deal more solid and monumental than in the other branches of Saracenic

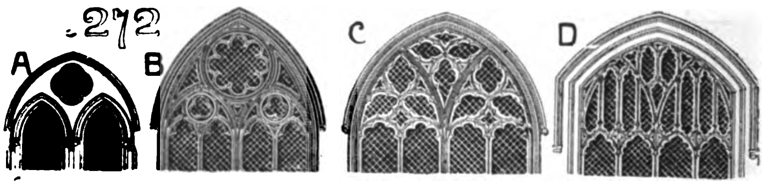
architecture; the predilection for domical roofing is also very marked, and this style of covering is carried out with great boldness and constructive skill. The typical square form of plan is predominant in the Indian mosques, but with important modifications. For instance, in the Jumma Musjid mosque at Beejapoor (sixteenth century), of which a small plan and section are subjoined (Fig. 271), we find the dome an important feature in the centre of the mosque itself, instead of being merely a covering to an accessory apartment; and this and other domes in the style are carried upon a very complex and ingenious system of intersecting vaults hanging inwards towards the centre. It is curious that while the horseshoe arch is not employed in wall-arches, it is often employed in the section of the domes, which are bulbous in shape, narrower at the springing than they are above; thus reversing the practice of Egypt, where the wall-arches and arcades are in the horseshoe shape, while the domes are straight-lined at the springing. The finest works in India are those executed under the rule of the Moguls in the middle of the sixteenth century, and more particularly during the latter half of the century, under Akbar, whose two finest buildings, the mosque at Futtehpur Sikri, and the Taj Mahal (see Plate X.), are examples of a style which is more perfect and complete, and more truly architectonic, than any other development of Saracenic architecture, which was thus attaining its climax in India at the time when it had fallen into debasement in Europe.

We must now return to Western architecture, and indicate briefly the phases through which the Gothic style passed to its decline in the sixteenth century. We left it at the

point, about the end of the twelfth and commencement of the thirteenth century, when it had become a complete pointed-arch style, entirely homogeneous in character, but still almost as simple and broad in design as the round-arched architecture out of which it had been developed. The progress of the style was, as with most architectural styles, toward a gradually increasing elaboration and richness in detail, by a succession of tolerably well-marked stages; and as these stages are on the whole more clearly defined in English Gothic than elsewhere, and have received in this country a distinct classification and nomenclature, we may take the progress of English Gothic as typical. Let us first observe that the most marked and easily obvious feature in the distinction of successive styles of English Gothic is the treatment of the windows, which has mainly suggested the nomenclature generally adopted. The traceried window is a special characteristic of European mediæval architecture. It is true that Saracenic architecture, in Egypt, India, and Spain, shows windows filled in with very rich and beautiful pierced ornament (Fig. 267, page 300), but this is ornament unconnected with the main architectural design; it is a filling to the window which might be designed and fitted in separately; whereas the tracery of the Gothic window springs from and is connected with the constructional portion of the window itself, and hence seems, as it were, a part of the architecture. In the first style of complete Gothic in this country, known as "Early English," and extending from about 1185 to 1245, the windows are plain pointed openings, tall and narrow in proportion,*

* Sometimes called "lancet" windows, from their resemblance to the blade of a lancet, hence the name "Lancet style," formerly used for what is now more generally and reasonably called the "Early English" style.

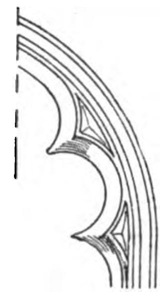
sometimes single, but more frequently in groups of two, three, five, or seven. The placing of these openings closer together, and piercing the space between their heads, would suggest naturally the combination of the whole into one window with merely bar divisions, and with the pierced openings in the head combined into one design of a geometrical character, *i.e.*, based on such figures as circles and triangles. Such windows characterise the style from 1245 to about 1315, called indifferently the "Early Decorated" style (from its increased use of ornament), or the "Geometrical," from the character of the window tracery. The "Late Decorated" style, which lasted about half a century, is characterised by the



A, early English: B, early Decorated: C, late Decorated: D, Perpendicular.

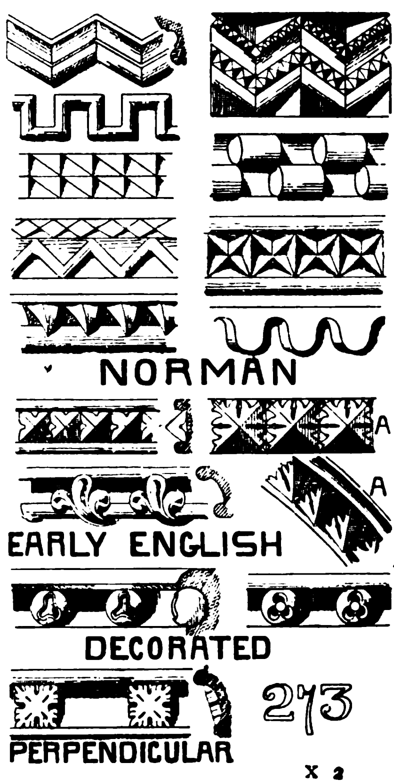
abandonment of purely geometric forms in the window tracery, which becomes more flowing in character, and in which, for the first time, the eye is directed not so much to the shape of the openings as to the lines of the tracery bars. In the closing phase of English Gothic, the "Perpendicular" period, the principal vertical lines of the window design are carried right through to die into the arch of the window-head; in the early Perpendicular style there is generally a certain amount of curved tracery design in the window-head, through which the vertical bars cut; in the later buildings of the style tracery design nearly disappears, and the window becomes little more

than a collection of panels formed by the intersection of vertical and horizontal bars; always, however, with an arched head to each panel, divided into small sub-arches by that device called "cusping" (see sketch) which is a universal feature of Gothic architecture in and after the Early Decorated period. The Perpendicular style lasted till the final decay of Gothic architecture about the middle of the sixteenth century.



The several forms of window are given in Fig. 272; the typical sections of moulding characteristic of each period have been given in Fig. 254 (page 286; see also pages 138–9, 141–2). In Fig. 273 are shown some typical forms of ornament of the various periods. The Norman ornaments, though rude in design, show much greater variety than in the later mediæval periods, when one or two staple forms of repeating ornament were almost exclusively used.

The principal forms of vaulting have been

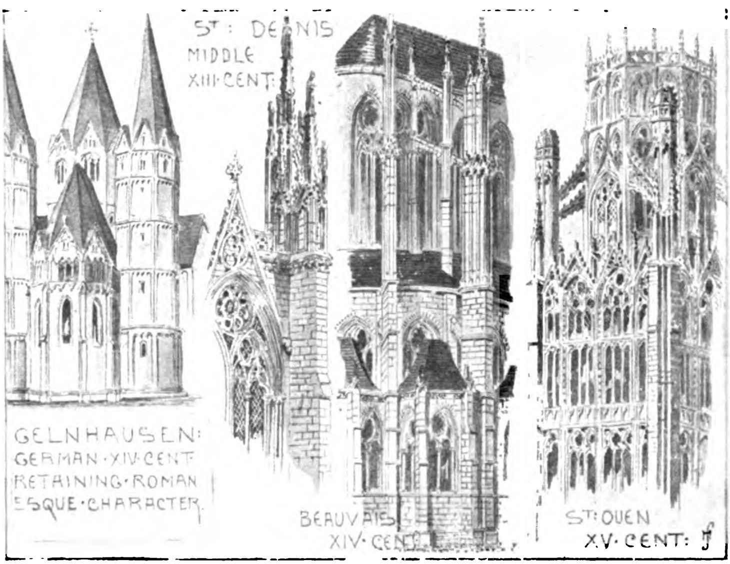


indicated in Figs. 108, 109, 110 (page 112); Fig. 108 representing the simple cross vaulting common in Early English and Early Decorated structure; Fig. 109 the greater elaboration derived from the introduction of intermediate ribs in the later Decorated period, and Fig. 110 the fan vaulting peculiar to the late Perpendicular (sometimes called the Tudor) period. Between these two forms is an intermediate type of vaulting belonging to the late Decorated and early Perpendicular period, in which the main constructive lines remain as in Fig. 109, but the surfaces between them are diversified with smaller merely ornamental ribs, forming the connecting link between the vault built of constructive ribs and the fan vault, in which, as already pointed out (pp. 115, 116), the ribs became merely a piece of architectural expression, unnecessary to the construction.

On Plate XI. the leading characteristics of the successive styles are illustrated in some sketches of portions of buildings; and we may further summarise the whole thus:

Norman . . . . *Circa* 1066–1145.	Round arches; large coarse mouldings; small round-headed windows; wide flat buttresses; carved ornament mostly of coarse artificial devices; abacus of capitals square (except where the pier is a plain cylinder, as at Gloucester). *Examples*: Nave, Gloucester; Nave and lower part of choir, Norwich; Naves of Durham and Ely.
Transitional . . . *Circa* 1145–1190.	A Transitional style between Norman and Early English is recognisable, in which pointed arches are mixed with round, and carved foliage capitals are introduced beneath the Norman square abacus. *Examples*: Part of choir and transepts, Ripon; Choir, Canterbury.

XI.



LATER DEVELOPMENT OF GOTHIC.

Early English . . . *Circa* 1190–1245.	Deeper buttresses with gabled finish rising above the roof-parapet; tall narrow windows, generally in groups; capitals circular on plan, deeply moulded or with beautiful conventional floral carving; mouldings more elaborate and more undercut; ornament sparingly used; piers often with slender detached shafts added. *Examples*: Salisbury (nearly throughout); Nave and transepts, Lincoln; Transepts, York; Nave and transepts, Wells; West front, Peterborough.
Early Decorated or Geometrical *Circa* 1245–1315.	Wide windows divided by mullions and with tracery in geometrical patterns; more extended use of carved ornament, such as crockets and finials. *Examples*: Choir, Lincoln; Chapter-house, York.
Late Decorated . . . *Circa* 1315–1360.	Greater richness generally; proportion of arches wider; mouldings more shallow and less effective; buttresses richly decorated with crockets, finials, and niches; angle buttresses often set obliquely; foliage carving more realistic; window tracery of more flowing design; prevalence of "ball-flower" ornament (see Fig. 273). *Examples*: Exeter, nave and choir; East end, Wells; West front, York; Tower and spire, Salisbury.
Perpendicular (early) . . *Circa* 1360–1440.	Vertical-lined tracery; wide shallow mouldings; very thin shafts with octagon capitals and bases; square flower carvings used as repeating ornaments; four-centred arches; decorative surface-ribs in vaulting; panelling largely used as surface ornament. *Examples*: Nave, Winchester; Lady Chapel, Gloucester.
Late Perpendicular (Tudor)— *Circa* 1440–1550.	Fan vaulting; increased use of surface panelling. *Examples*: Cloisters, Gloucester; Retro-choir, Peterborough; Henry VII.'s Chapel, Westminster; King's Chapel, Cambridge.

Of these English divisions of style, that called "Early English" is peculiar to England so far as the delicate proportions and grouping of the long lancet-shaped windows are concerned, and in refinement of design and detail generally it is superior to anything of the same date and development in France. The Perpendicular style is not represented elsewhere by the vertical bar-tracery which gives its name to the English style,* though some of its other characteristics may be found in the same stage of development in France and Germany; and the Tudor style, with its fan vaulting, is absolutely and exclusively English, and in fact culminated at a period when French Gothic had been fairly invaded by Renaissance detail.† In spite of these distinctions, however, no one who has mastered the characteristics of the various phases of English Gothic will have much difficulty in assigning French and German examples to their approximate positions in regard to chronology and architectural development. There are differences in form, but the general spirit of the styles of the twelfth, thirteenth, and fourteenth centuries is recognisable in France and Germany as parallel with the characteristics we have noticed in English architecture; France, as the *fons et origo* of the style, being always a little in advance of the two other countries, except in the fact that the type of detail of what we call in England the

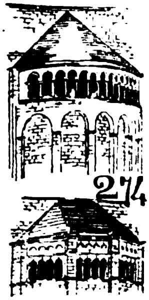
* The window tracery of the same period in France took the form called "Flamboyant," from the flame-like shape of the openings (see sketch).

† See as an example the church of St. Eustache at Paris (1532), in which the vault is like the English vault of the early Perpendicular style—a cross vault with ornamental surface ribs added; while the architecture generally is so impregnated with Renaissance feeling as to have almost ceased to be Gothic.

"Transitional" style (between Norman and Early English)—the style with square *abaci* to the capitals, and a certain amount of Romanesque feeling still pervading it—lasts longer than it did in England; it survives till the establishment of the Early Decorated or Geometric style, instead of developing, as in England, into the "Lancet" style, which in French architecture we may regard as left out, so to speak. We may regard Laon (early part of twelfth century) as the correlative in France of our Transitional style, and Chartres (completed 1240) as representing what was going on in France during our Early English style; comparing the two, we see that at this period there was much less active development of style in France than in England. Amiens, completed about twenty years later, comes closer to Early English work in the details of its west front, which remind one in many points of Salisbury; but internally the piers and capitals of its nave arcade are still of what in England would be called the Transitional type. Rheims may be taken as a typical example of French "Decorated" Gothic of the earlier type. Here we have a general effect of great richness, but with the reserve and architectonic expression arising from the use of well-defined geometrical form in the detail, and this is the characteristic of the best period of French Gothic, which combines the general form of the English Early Decorated with a richness characteristic rather of our late Decorated. St. Ouen at Rouen contains later and more florid developments of the style, which passes insensibly into the "Flamboyant," of which the west front of Troyes (early sixteenth century) and St. Maclou, at Rouen, afford good examples.

The predilection of the French architects for a circular

or "rose" window at the west end of their churches, in place of our large vertical west window, is a point to be noted.



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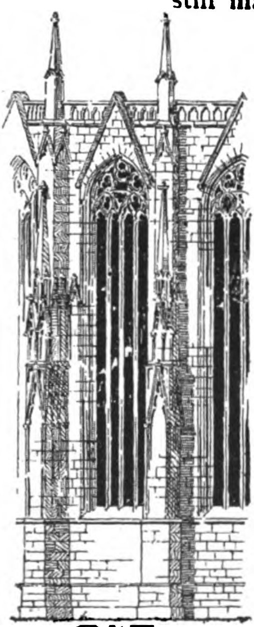
German Gothic long retained the bare and primitive style of Romanesque work, with its small detached windows and long strips of flat pilaster-like buttresses, and square or octagonal towers surmounted naïvely by plain timber spires. The church at Gelnhausen (1210–1220), built at a time when our Early English style was at its height, still maintains this primitive type of Gothic (see Plate XI.). Among the points in this early German style are the prevalence of small towers or turrets, generally octagonal, and (which is one of its best features) the use of open arcaded galleries decorating the blind portion of external wall between the springing of the stone vault and that of the timber roof (Fig. 274), just as the triforium arcade is applied internally in an English church. In the period corresponding to our Decorated style the German architects adopted a very long and narrow type of window, similar to our lancet window and even more attenuated, but decorated in the head with tracery (Fig. 275). This long wire-drawn proportion is characteristic of complete German Gothic throughout its course, and its later and more florid developments



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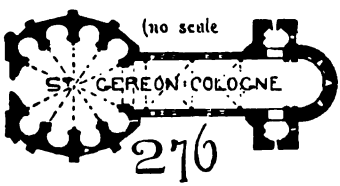
(answering to our Decorated style), of which Cologne Cathedral and Freiburg Church are well-known and typical examples, are all distinguished by a hard cast-iron type of detail and the employment of angular geometrical forms. A more favourable type of fifteenth century German cathedral is St. Stephen's, Vienna, the towers and spires of which have more of architectural beauty and refinement than Cologne, which, like St. Peter's, is impressive mainly from its immense scale. The latest German Gothic is the worst of all the late mediæval developments, being still more hard and wiry in effect, and degraded by poor tricks of design, such as mouldings that appear to interpenetrate, and tracery cut off in short stumps, as in the accompanying sketch.

GERMAN TRACERY PANEL

German churches present, however, many interesting varieties of plan, as in St. Gereon, Cologne, with its oval nave, and the Apostles' Church in the same city, with its tri-apsidal arrangement (Fig. 276); Treves, with its nearly circular nave surrounded by chapels; and in this respect they are worth special study. The great town-halls of some of the North German cities, also, are splendid examples of municipal architecture in the Gothic style, such as that of Ypres (thirteenth century) and Louvain (fifteenth



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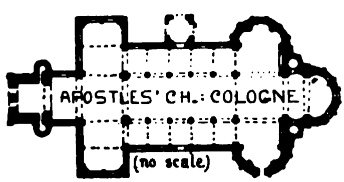


century); and this class of buildings, in their breadth of treatment and great scale, has scarcely a parallel in the mediæval architecture of any other country.

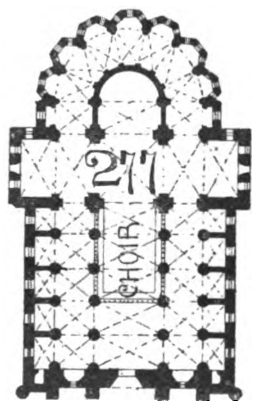
The northern portions of Germany, near the Baltic, developed a phase of Gothic of their own, arising out of the almost exclusive use of brick as a building material; a style in which, owing to the restrictions imposed by the material, a great deal of the severe and bald character of the early German Gothic survived until a late period, only with pointed arches instead of round, and retaining always the plain timber spire which was the characteristic of early German architecture generally.*

Gothic architecture in Spain followed a course very similar to that of England during the Norman, Early English, and Early Decorated periods. The period corresponding to the Early English is not very dissimilar to our style, except that the square abacus is retained; and this period of Spanish, like Early English, is to a considerable extent special to the country. In the Decorated period, when traceried windows and other concomitant details came into use, the style came more directly under French influence. In the period of late Gothic, Spanish architecture went into many vagaries of detail of its own, which are hardly capable of classification. Some of these, no doubt, are to be traced to the indirect influence of Moorish architecture; and in the

* An interesting paper by Mr. J. Tavernor Perry, on "The Influence of the Hanseatic League on the Architecture of Northern Europe," will be found in the "Transactions of the Institute of British Architects" (May 31, 1894). It throws some new light on the causes of the architectural resemblance between places far apart, and on the connection between the brick architecture of North Germany and some of that in England at the same period.

south of Spain, where the Spanish style was in close neighbourhood with the Moorish or Saracenic intrusion, we find, even in the earlier mediæval period, examples, as at Toledo and elsewhere, of an almost absolute fusion of Gothic and Moorish elements.

The typical plan of the Spanish mediæval cathedral differs from that of any other country in the wideness of its proportions and the squareness of its general outline, which internally at all events usually presents a plain parallelogram, with either an apsidal or a square termination; and the choir, instead of being a constructional division of the eastern portion of the building, is an enclosed space in the centre of what we should call the nave (see Fig. 277). The screens which thus enclose the choir are often of great richness and beauty of design, and are among the most striking features of the interior.



In Italy there was no real development of the pointed Gothic style, the traditional influence of Roman architecture, as already observed, never having quite lost its hold; so that while we find at the close of the thirteenth century the pointed arch adopted, with a certain degree of geometric tracery, in such buildings as the Cathedral at Florence, we find all the details treated with a flatness of effect, and a general prevalence of the horizontal line, which puts them in quite a different category from the Gothic architecture of Northern and Western Europe.

Broadly speaking, we may distinguish two classes of mediæval architecture in Italy: a round-arched style, or a style in which round and pointed arches are indiscriminately used, as in the Certosa at Pavia (end of fourteenth century, except the façade), and which is somewhat like a later and ornate edition of early German Gothic; and a completely pointed-arch style, of which the Cathedrals of Siena and Orvieto (latter part of thirteenth century), San Petronio at Bologna, and Florence and Milan Cathedrals, are the most notable examples. There are very strongly-marked local influences in Italian Gothic; Siena and Orvieto represent a special type which is bolder and more Gothic in feeling than usual, but marked also by profuse employment of coloured materials, especially bands of different-coloured masonry; Florence shows also an extensive use of coloured materials, but in a much less constructional manner—a marble veneer, in fact; Milan (end of fourteenth century) stands almost alone as a decisively Gothic cathedral on Italian soil, depending on architectural modelling rather than on colour; but a bad, flimsy type of Gothic; one of the buildings impressive from its scale rather than its design. The dome at Florence, though the Renaissance had really set in (in Italy) when it was commenced in 1420, may still be considered, in virtue of its pointed form and octagon plan, as a Gothic dome; the only large one in existence. In Venice, in such buildings as the Ca d' Oro, Italian Gothic put on a special form of its own, deriving from Eastern influence a certain richness of modelled detail much more akin to real Gothic than the hard and flat style of Italian Gothic generally. On the eastern shore of the Adriatic, in the region of Istria

and Dalmatia,* we find the round-arched and pointed-arched types of Italian Gothic mingled with work of distinctly Byzantine character. Mediæval Italy, in fact, was the scene of experiments in varying types of architecture, locally adopted and showing a certain local development, but never worked out into a great and complete style like that of mediæval France and England, and hence the more easily to be swept aside by the rising tide of the Renaissance.

Gothic architecture, it may be said, in its rapid development from style to style, fairly burned itself out, and it is difficult to conjecture into what eccentricities it might subsequently have declined, had not the revival of ancient Roman forms of architecture, which accompanied the general intellectual movement called the Renaissance, supervened to put new life into the art at this juncture.† No doubt the Renaissance introduced a totally different condition into architecture from what had ever existed before. For the first time in history, architecture was to go back to the precedents and models of a former age, instead of being the spontaneous and unfettered expression of the requirements and the constructive habits of its own time. The change was one of immense importance and significance; it entirely altered the conditions under which the art was carried on; and it

* Recently illustrated for English students in Mr. T. G. Jackson's admirable work.

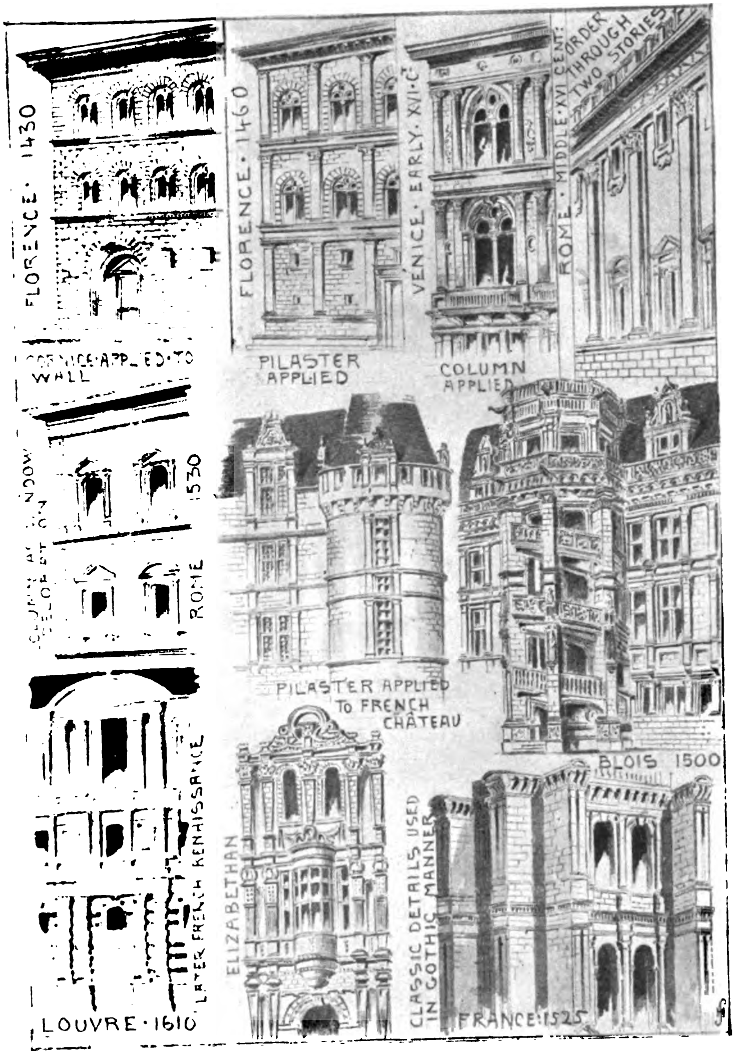
† In England, it must be admitted, such buildings as King's Chapel and Henry VII.'s Chapel may be said to represent exuberant life rather than decay, and further beautiful things might have been produced in such a style; but elsewhere than in England Gothic architecture was moribund when the Renaissance took its place.

has been represented by some modern critics as being practically the downfall of architecture and the end of all interest in it as a national art. But this is an exaggeration. Though the architects of the Italian Renaissance went back to the remains of ancient Rome for their materials,* they by no means contented themselves with mere copying. They made new combinations from the old materials. In the great Florentine Palaces, such as the Riccardi (1430), the Pitti (1435), and the Strozzi (1489),† which are among the earliest efforts of the Renaissance, the classic cornice is applied as the crowning feature to the wall, with no attempt to imitate the columnar order; the wall taking the place of the column. In other instances, as in the Vendramini Palace at Venice, we meet with buildings in which classical details are adapted to a façade which in its main feeling and effect still remains Gothic. The Roman device of using superimposed orders in successive stories was adopted, in other cases, in a purely Roman manner, but not without characteristic features of detail and treatment. This is no doubt a false architectural use of the columnar order, whether carried out by Roman or Renaissance architects, but it is impossible to deny that graceful and picturesque effects were often produced with it by the latter. A distinct invention of the Italian Renaissance is the

* It is important to bear in mind, in regarding Renaissance architecture as the revival of classic forms, that this only meant *Roman* forms. Of the far more refined and intellectual architecture of Greece, of which that of Rome was only a corruption, the Renaissance architects knew nothing.

† In regard to these dates, it should be noted that the Renaissance spirit had fastened upon architecture in Italy half a century before it spread into other parts of Europe.

XII.



RENAISSANCE USE OF CLASSIC MATERIALS.

form of palatial building which is entirely classical in detail, but which uses this detail merely to decorate the practical features of a great mansion—the walls and the windows—by cornices, string-courses, and window-heads and architraves, omitting all use (or misuse) of the columnar order; a class of building of which the Farnese Palace is a type, and which may be said to represent the common-sense of mansion architecture.

The worst sin committed by the Renaissance architects was the use of the columnar order in such a way as to contradict the actual facts of the structure, or to render the design self-contradictory; either by carrying the column through two stories of a building, although the columnar order properly and logically represents one story; or, as at St. Peter's, by placing two or three stories of windows between the columns, thus giving a one-story church the appearance of a building in floors. This form of abuse of the order was not much indulged in by the Romans; it is mainly due to the Renaissance architects of Italy, and is unfortunately one of their practices which has been most frequently copied in modern architecture.

In Italy, where the classical tradition retained its hold more or less throughout the mediæval period, Renaissance architecture took a more decisively Roman form than was the case in countries such as France and England, in which mediæval architecture had been thoroughly developed. In the time of Francis I. in France, for instance, we find an entirely distinctive style, in which classic pilasters flank windows which, with their moulded mullions and transoms, are really late Gothic detail; and the whole appearance of a French château of the period, with its multifarious chimneys and finials, and its windows grouped together in

tiers, divided by spaces of bare wall, is much more Gothic than Renaissance, though the majority of the details are Renaissance. Such a building as the Château of Blois, also, belonging to a period a century later, though every trace of Gothic detail has vanished, still retains in its exuberant picturesqueness a great deal of the feeling of mediæval architecture, and belongs to a different world from the more cold and sober classicism of Florence and Rome. In England again, the style known as "Elizabethan" is really the last phase of Gothic architecture just beginning to be invaded by classic detail, and with some details (such as the gable with reversed curves) peculiar to itself; and its immediate successor, the Jacobean style (which, however, commenced before the reign of James), the English counterpart of the Francis I. style, only later in date, showed a peculiarly picturesque combination of Gothic windows with Renaissance settings, of which Wollaton Hall, near Nottingham, is one of the finest examples. In Spain the early Renaissance took a form special to the country, in that graceful and picturesque phase of architecture known as the "Plateresque," nearly coeval with the Francis I. style in France (it commenced rather later), and in which we can detect the influence of the spirit of Moorish art in modifying the Renaissance forms. Sketches of typical bits of these various phases of Renaissance architecture are given on Plate XII. Both in Spain and in England the picturesque mixed forms of the early Renaissance were followed by a dry pedantic classicism, redeemed from commonplace in England by the personal genius of Wren, who, though dealing with very bad detail, put the stamp of his own originality of handling on most of his works. In Germany the Renaissance hardly pro-

duced any architecture worth study or attention, except for a certain coarse picturesqueness. In France, on the other hand, a distinct artistic spirit and individuality in design marked, for the most part, the work of the Renaissance architects down to the period of the Revolution; it was only under the Empire that they sank for a time into mere academical design.

The most notable single buildings of the Renaissance period are Versailles, designed by Mansard for Louis XIV.; the Escurial (latter part of sixteenth century); St. Peter's, Rome; and St. Paul's, London. To these we might add the Louvre, which contains some of the finest French Renaissance architecture, but which is rather a collection of buildings of different styles and dates (Francis I. to Louis XIV.) than a single building. Of these, Versailles and the Escurial are academical works, remarkable chiefly for their extent. St. Peter's, completed as it now stands in 1626, colossal both in general scale and in detail, is a coarse and ill-designed building, impressive mainly by its vast scale. St. Paul's (1675–1710), in spite of its weak and commonplace detail, and of the deceptive construction already described (page 98), is externally, without question, the finest and most harmonious architectural composition on a great scale which Renaissance architecture has produced, superior to St. Peter's in every quality except actual size and the deceptive exterior construction of the dome.

In modern times, in this country and to some extent elsewhere, architecture has been a series of revivals; we have had a Greek revival, then a Gothic one, and are now having a revival of the Renaissance. The Germans are still under the influence of the Greek revival, which

they took up about the same time as ourselves, and a cold academical correctness is the best praise that they can claim, or apparently care to claim. France alone may be said to have at present something like a living architecture, the result of thought and design rather than of mere imitation. But our own present Renaissance revival is being carried out with more of originality, with more perception that something else than mere copying is required, than was the case with our Greek and Gothic revivals, and may be leading to a new development of English architecture. What is certain is that architecture can never again be carried on, in any civilised country, as it was before the Renaissance, as an independent national art spontaneously working out its own evolution. Our modern knowledge of the architecture of other times and of other countries, arising from the multiplication of books and the increased facilities of travel and intercommunication, renders any such isolated position impossible. Architecture is now, and must be for the future, a personal art, like sculpture and painting, in which the individual architect gives his impress to his own work, only influenced, more or less, like the sculptor and painter, by the prevalent taste or tendency of the day.

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THE END.

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